

MARICOPA ASSOCIATION OF GOVERNMENTS



REGIONAL OFF-STREET SYSTEM PLAN

Creating Non-Motorized Paths/Trails in Existing Corridors

February 28, 2001



MARICOPA ASSOCIATION OF GOVERNMENTS (MAG)

REGIONAL OFF-STREET SYSTEM (ROSS) PLAN

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DEFINITION OF TERMS AND ABBREVIATIONS

AASHTO

The American Association of State Highway and Transportation Officials (AASHTO) has created design guidelines for bicycle travel ways. Projects which use federal transportation funds need to meet or exceed these development guidelines.

ADA

The Americans with Disabilities Act (ADA) is a federal law passed in 1990 which furthers the goal of full and equal participation of Americans with disabilities. It guarantees equal opportunity for individuals with disabilities in employment, public facilities, transportation, state/local government services, and telecommunications; including requiring that public entities provide accessible accommodations for persons with disabilities.

ADOT

Arizona Department of Transportation.

Bike Lane

A portion of a roadway which has been designated by striping, signing and pavement markings for the preferential or exclusive use of bicyclists.

Bike Route

A segment of a system of bikeways designated by the jurisdiction having authority with appropriate directional and informational markers, with or without a specific bicycle route number.

Canal

A canal is a water conveyance feature which intersects roadways. Operations and maintenance (O & M) roads run parallel next to canals and provide an off-street non-motorized travel opportunity. The O & M roads are typically dirt or rock with a relatively flat grade. Many of these corridors are currently in use for off-street, non-motorized travel. Public access is allowed on canals managed by the Salt River Project, but currently prohibited along the Central Arizona Project Canal, canals managed by the Buckeye Irrigation District, and canals managed by the Roosevelt Irrigation District.



Corridor

A corridor is a narrow tract of land forming a passageway that connects two or more destinations. Corridors identified in the ROSS plan include canals, flood control structures and rights-of-way, utility easements, railway corridors, desert washes and waterways, and highway and freeway rights-of-way. The width of these corridors vary from five (5) feet to several hundred feet. They may be natural or constructed, curvilinear or straight.

CPTED

Crime Prevention Through Environmental Design (CPTED) is a relatively new design concept which posits that crime can be reduced by incorporating features, such as increased lighting or smaller scale vegetation, into the physical environment. More information on CPTED is provided in Appendix A.

Desert Washes and Waterways

The natural drainage of the desert consists of washes. These channels are typically shallow, rocky, and dry most of the year. Throughout the MAG region, most washes have been diverted, channelized, or eliminated; however, some have been preserved as natural resources. Many have rich vegetation along the banks where moisture is concentrated.

Facilities

A general term denoting improvements and provisions made by public agencies to accommodate or encourage bicycling and walking, or other non-motorized transportation, such as roller blading and horse riding.

FHWA

Federal Highway Administration.

Flood Control District of Maricopa County (FCDMC) Structures and Rights-of-Way

FCDMC structures and rights-of-way include interceptor channels and dam structures. They exist throughout the MAG region along rivers and range in length from several feet to 35 miles. Their landscape characteristics can be steep concrete channels, open vegetated swales, or earthen embankments. There are typically operations and maintenance roads on each side that may be suitable for a non-motorized travel way.

Highway

A general term denoting a public way for purposes of vehicular travel including the entire area within the right-of-way.



Highway and Freeway Rights-of-Way

Highway and freeway rights-of-way include off-street corridors along drainage channels and sound walls. A path placed in these types of corridors would be screened and buffered from high-speed traffic while maintaining access to destinations also accessible by automobile.

Land Banking

Land Banking is a process to reserve land for conservation purposes. Either public or private land can be land banked to help mitigate the negative impacts of development. For more information on land banking, please see Appendix B.

LRTP

The MAG Long Range Transportation Plan (LRTP) addresses all modes of transportation for at least a 20-year time period: airports, bicycles, freeways, pedestrians, streets and transit. The plan also addresses special transportation needs and safety. To incorporate recent planning studies and demographic and economic projections, and to ensure consistency with the most recent air quality plans, the LRTP is updated annually if feasible.

MAG

The Maricopa Association of Governments (MAG) was formed in 1967 to address regional planning needs. The member agencies of MAG include incorporated cities and towns within Maricopa County, the County, the Gila River Indian Community and the Salt River Pima-Maricopa Indian Community. In transportation, MAG has been designated by the Governor as the Metropolitan Planning Organization in accordance with Federal requirements. Also, MAG has been designated as the Lead Air Quality Planning Agency by the Governor.

The governing body of MAG is the Regional Council, which includes a representative of each member agency and two representatives from the Arizona State Transportation Board. In addition, the Chairman of the Citizens Transportation Oversight Committee (CTOC) serves as an ex-officio member on matters relating to the Regional Freeway System.

The MAG Management Committee and four MAG policy committees report directly to the Regional Council. In addition to the policy committees, MAG has 20 technical committees, many of which address transportation issues.



Nodes and Gathering Places

A node or gathering place is any place where people collect and interact. A node might be an intersection where two paths/trails cross. A gathering place may be where people congregate before beginning their journey via a path or trail. The speed of travel will often slow, or even stop at these points; therefore, these locations require more attention to site circulation and human comfort. Paths/trails that provide these opportunities are typically more successful since people need places to stop, rest, get directions and socialize.

Non-Motorized Facilities

A general term denoting improvement and provisions made to facilities including any path, lane, route, trail, special shoulder or other treatment to provide on-road or off-road transportation to pedestrians, bicyclists, in-line skaters and equestrians.

Path/Trail

As used in the ROSS document, a path/trail refers to either a shared-use path or shared-use trail.

PWG

The Pedestrian Working Group (PWG) is a MAG technical advisory committee providing joint oversight of the MAG ROSS. The Working Group consists of representatives of MAG member agencies and a representative of the Arizona Society of Landscape Architects. The Working Group annually reviews and updates the MAG *Pedestrian Plan 2000* and develops activities to educate the region about the benefits of walking.

Rail Corridor

A rail corridor is any set of tracks in use, or once used, by commuter and/or freight trains to transport people and/or goods.

RBTF

The Regional Bicycle Task Force (RBTF) is a MAG technical advisory committee providing joint oversight of the MAG ROSS. The Task Force is comprised of representatives from MAG member agencies, the Arizona Department of Transportation and Valley Metro. The Task Force has developed a Regional Bicycle Plan which primarily addresses on-street facilities, and also encourages the implementation of the Plan by recommending bicycle-related projects for funding from federal and other sources.

Regional Trails Forum

A series of meetings organized to obtain input from citizens and other organizations on the ROSS Plan.



Right-of Way

A general term denoting land, property, or interest therein, usually in a strip, acquired for or devoted to transportation purposes.

Roadway

The portion of the highway, including shoulders, for vehicle use.

ROSS

The Regional Off-Street System (ROSS) Plan serves to complement the existing MAG Regional Bicycle Plan by identifying existing off-street corridors which could be used for non-motorized transportation.

SRP

The Salt River Project (SRP) provides both water and power to Valley residents. SRP maintains authority over approximately 130 miles of canals in the urbanized portion of the MAG region.

Shared Roadway

Any roadway upon which a bicycle lane is not designated and which may be legally used by bicycles regardless of whether such facility is specifically designated as a bikeway.

Shared -Use Path (Class I Facility)

According to AASHTO, a facility which is on a completely separate right-of-way from the roadway and sidewalk and designated for the use of bicycles, pedestrians and/or other non-motorized travelers. Cross flows with motor vehicles should be minimized whenever possible.

Shared-Use Trail

A path of travel within a designated corridor that is not classified as a highway, road or street. Trails provide travel opportunities for bicyclists, pedestrians and other non-motorized travelers, such as equestrians.

Sidewalk

The portion of a highway designed for preferential or exclusive use by pedestrians.

TEA-21

The Transportation Equity Act for the 21st Century (TEA-21) was signed into law on June 20, 1998 and has numerous provisions that relate to improving conditions for bicycling and walking. TEA-21 confirms and continues the principle established in the Intermodal



Surface Transportation Efficiency Act (ISTEA): planning and giving "due consideration" of non-motorized travel needs is to be given during the planning, developing, and construction of all Federal-aid transportation projects.

According to the FHWA Guidance on Bicycle and Pedestrian Provisions of Federal Transportation Legislation: " 'Due consideration' of bicycle and pedestrian needs should include, at a minimum, a presumption that bicyclists and pedestrians will be accommodated in the design of new and improved transportation facilities. In the planning, design, and operation of transportation facilities, bicyclists and pedestrians should be included as a matter of routine, and the decision to not accommodate them should be the exception rather than the rule...Maintaining access to the transportation system for nonmotorized users is not an optional activity."

TIP

The MAG Transportation Improvement Program (TIP) is prepared annually by MAG. The TIP lists federally funded projects for the MAG region. The TIP serves as a five-year regional guide for the preservation, management and expansion of public transportation services including highways, arterial streets, transit, demand management and alternative mode improvements in Maricopa County. MAG, in cooperation with the Arizona Department of Transportation (ADOT) and the Regional Public Transportation Authority (RPTA), is responsible for the development of the MAG TIP.

Utility Easements Corridor

Utility easements corridors include powerline corridors as well as gasline easements or rights-of-way.



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SECTION I: EXECUTIVE SUMMARY

INTRODUCTION

The Regional Off-Street System (ROSS) Plan, initiated by the Maricopa Association of Governments (MAG), reveals a region-wide system of off-street paths/trails for non-motorized transportation. Throughout the MAG region, numerous opportunities for off-street travel by people who walk and bicycle exist along areas such as canal banks, utility



Figure 1-1: Shared-Use Path Near the Roosevelt Irrigation Company Canal in Goodyear.

line easements and flood control channels. These types of rights-of-way and easements intersect numerous arterial streets where local daily destinations are typically located. The goal of the ROSS Plan is to help make bicycling and walking viable options for daily travel trips using off-street opportunities.

The possibility of developing and expanding travel options for people who bicycle and walk offers many benefits to residents in the MAG region. These benefits include reduced traffic congestion and air pollution

from less local trips made by automobile, and improved health and well-being that comes from regular exercise. While not all trips can be replaced by bicycling and walking, many can, such as walking to work or the bus stop, children riding bicycles to school, errands to the grocery or video store and after-school sporting activities.

The ROSS Plan provides guidance to MAG member agencies in creating an off-street non-motorized transportation system. The Plan focuses on potential corridors that form the backbone of a regional off-street system of routes. Other off-street segments will be necessary to provide additional connections between origins and destinations. The ROSS Plan identifies issues associated with paths/trails and non-motorized transportation, identifies corridors which could be used for paths/trails in the MAG region and provides



design guidelines for paths/trails. Creating the plan also helps to provide support for federal transportation funding requests.

METHODOLOGY

The MAG Regional Bicycle Plan was adopted by the Regional Council in February, 1992. The Regional Bicycle Plan has been incorporated into the region's Long Range Transportation Plan. A bicycle plan update was approved by the MAG Regional Council in March, 1999. The update revised goals and objectives, changed evaluation criteria for project selection, enhanced plan maps, updated the funding plan and documented future possible planning activities. Because the original 1992 plan emphasized on-street facilities, the update also gave limited attention to potential off-street facilities in providing access and mobility for bicyclists. Creating a regional off-street shared-use path/trail plan was identified as an important future planning activity during the plan update. The off-street network was envisioned to include paved paths and unpaved transportation trails. The fiscal year 2000 Unified Planning Work Program and Annual Budget adopted by the MAG Regional Council in May 1999 contains a bicycle component and specifically identifies developing the ROSS Plan.

RBF Consulting was hired to assist the Regional Bicycle Task Force (RBTF) and Pedestrian Working Group (PWG) to develop the ROSS Plan. In consultation with MAG, the consultant developed a scope of work to complete the ROSS Plan. Key planning tasks included: public and agency involvement; issues identification; developing a plan vision statement, goals and objectives; identifying and evaluating corridors; creating design guidelines; developing implementation strategies and identifying potential funding sources.

ISSUES

While specific issues and needs will vary between individual communities and among different types of users, a clear understanding of issues helps to define problems that the

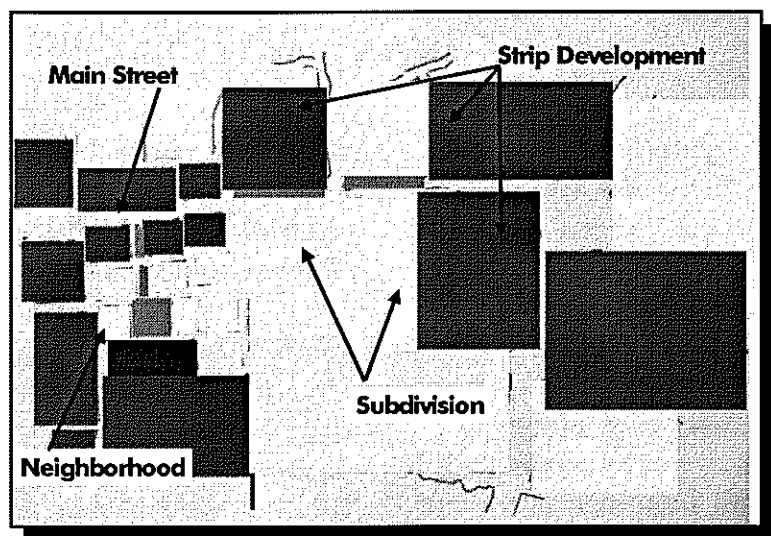
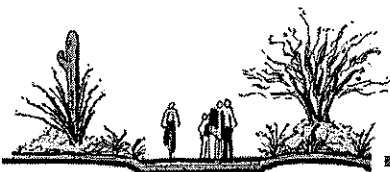


Figure 1-2: Traditional Urban Development Pattern Vs. Current Development Pattern.



planning process should address. Identifying a broad range of issues also helps to define goals and objectives and guides the way to solving issue-related problems. Section III of the ROSS Plan outlines existing regional trends which contribute to use of non-motorized transportation, general benefits of bicycling and walking, the importance of the on-road transportation system for bicyclists and pedestrians, and the need for an off-street non-motorized transportation system. The chapter concludes with issues identified through the planning process with the assistance of the RBTF, PWG and participants in the Regional Trails Forum meetings.

VISION STATEMENT, GOALS AND OBJECTIVES

The vision statement, goals and objectives were developed in consultation with the RBTF, PWG and participants in the Regional Trails Forum meetings. The vision statement paints a picture of the future once the Plan is implemented and helps define the future of the regional off-street non-motorized transportation system.

The five key issue areas defined in Section III provide the framework for the goals and objectives. The goals address the five issue areas of access, safety, connectivity, user-friendly and implementation, and provide guidance to MAG and its member agencies in making bicycling and walking viable options for daily travel trips. Replacing single-occupant motorized vehicle trips with bicycling and walking helps to improve air quality and relieve congestion. Each goal lists a number of objectives which are more specific measures to help achieve each of the goals. The vision statement, goals and objectives are provided on the following pages of this Executive Summary.



Figure 1-3: Visions of a Non-Motorized Transportation System



Vision Statement

Residents of the MAG region have safe, convenient access to an attractive, shared-use, non-motorized transportation system that provides a viable alternative to driving for local trips, such as trips to work, school, shopping and leisure activities.

Access Goal

Provide sufficient, convenient access to the non-motorized off-street transportation system which is highly visible to existing and potential users.

Access Objectives. Use design guidelines identified in the ROSS Plan, such as unique landscaping and special signs, to make path/trail access points more visible to existing and potential users.

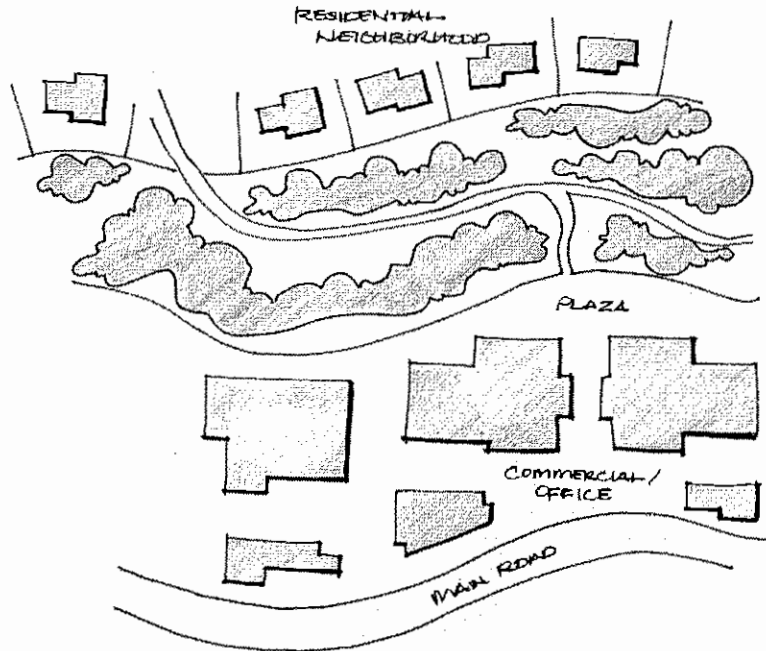


Figure 1-4: Residential Area Linked to Commercial/Office Space Using an Off-Street Route.

Alleviate, or remove, barriers to non-motorized travel by implementing the design guidelines and recommendations included in the ROSS Plan.

Design an off-street path/trail system that provides a sufficient number of access points to provide access to numerous users.

Whenever possible, ensure that design of off-street paths/trails meets or exceeds the Americans with Disabilities Act (ADA) Design Guidelines.

Encourage land use patterns which place origin and destination points within reasonable walking and bicycling distance of one another.



Safety Goal

Develop an off-street system of paths/trails that is safe for a variety of users.

Safety Objectives. Design paths/trails within multi-purpose corridors to meet the needs of non-motorized travelers without infringing on the original purpose of the corridor.

Use Crime Prevention Through Environmental Design (CPTED) techniques to address personal safety concerns (see Appendix A).

Improve safety of users through design guidelines that regulate appropriate distance from and access to dangerous features, such as fast-moving water or sand-and-gravel pits.

Promote the adherence to nationally and regionally accepted design guidelines in the development of paths/trails, including the American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Development of Bicycle Facilities*, the *Manual of Uniform Traffic Control Devices (MUTCD)*, the *MAG Pedestrian Plan 2000*, the *MAG Pedestrian Area Policies and Design Guidelines* and the ROSS Plan.

Connectivity Goal

Connect origins and destinations with paths/trails, and link paths/trails to the existing on-street transportation system and other transportation modes.

Connectivity Objectives. Connect origins and destinations with continuous and direct off-street routes to encourage non-motorized travel.

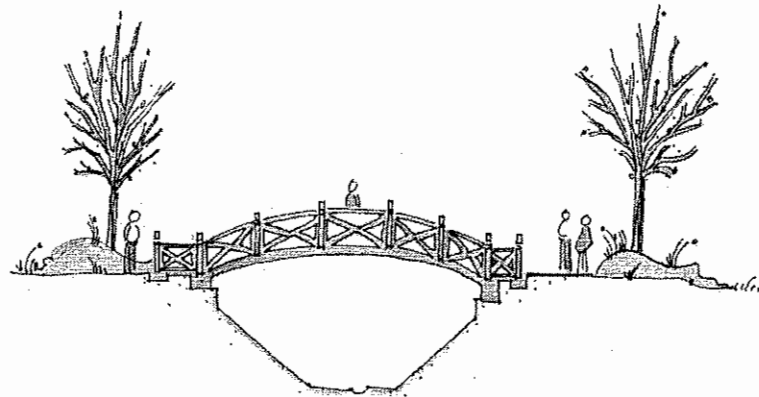


Figure 1-5: It May Be Necessary to Cross Barriers, Such as this Waterway, to Make Appropriate Connections for Non-Motorized Travelers.

Develop design guidelines in the ROSS Plan to minimize barriers to riding a bike or walking along paths/trails.



Provide grade separations to maintain connectivity of paths/trails over barriers such as freeways and high-speed, highly-traveled roadways.

When grade separated crossings are not feasible, use *Alternative Solutions to Pedestrian Mid-Block Crossings at Canals* to provide guidance for at-grade crossings, prepared for MAG in association with the City of Tempe in 1999 (see Appendix C).

Link the off-street non-motorized transportation system with the on-street system (such as bicycle lanes and wide outside lanes along arterial streets) and other modes of transportation (such as bus routes, light rail and park-and-ride lots) to optimize opportunities for travel by bicyclists and pedestrians.

Identify obvious gaps in the existing system of off-street paths/trails and develop methods to eliminate these gaps thereby encouraging bicycling and walking.

User-Friendly Goal

Develop a system of paths/trails that considers the needs of users and potential users (user-friendly).

User-Friendly Objectives.

Design attractive and appropriate facilities based upon user needs, surrounding land uses and community character.

Provide an appropriate level of amenities to meet user needs, such as drinking fountains, rest areas, signage, lighting, shade and sufficient bicycle parking.

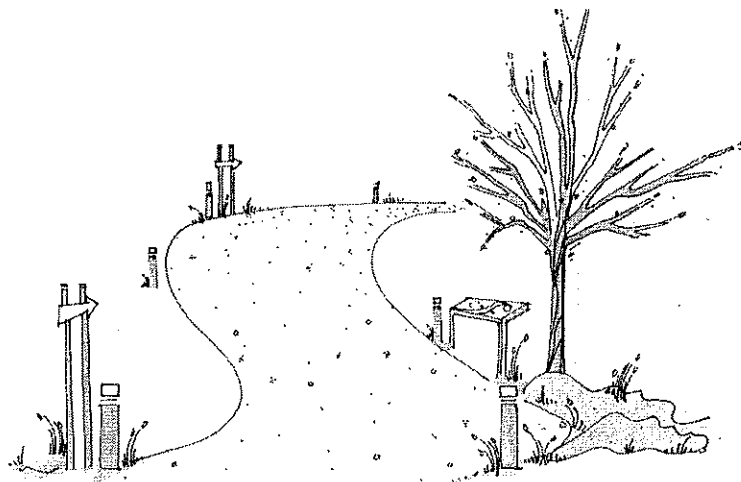
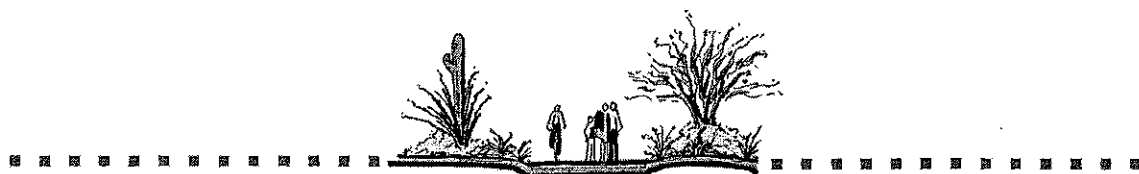


Figure 1-6: A User-Friendly Path/Trail.

Minimize conflicts between users by employing guidelines identified in the MAG ROSS Plan.

Maintain pathways to achieve a pleasant and safe travel experience.



Implementation Goal

Achieve a truly regional system of off-street paths/trails by assisting MAG member agencies in developing portions of the off-street system under their jurisdiction.

Implementation Objectives. Create partnerships with private and public sector organizations to encourage the development of non-motorized transportation facilities that will meet the needs of the community without infringing on the original purpose of the right-of-way.

Encourage funding of projects which provide off-street travel opportunities in areas where expansion or retrofit of on-street facilities is cost prohibitive.

Identify potential solutions to resolve issues associated with developing paths/trails in corridors and rights-of-way, such as operations and maintenance, in the ROSS Plan.

Develop flexible design guidelines to address circumstances that may be encountered when developing in rights-of way with size or policy constraints.

Develop a model ordinance for MAG member agencies to incorporate into planning and review processes for developer provision of easements and development of critical pathway segments.

Consider and identify creative ways and approaches to implementing the system, such as shared use agreements, model ordinances and shared funding opportunities.

Promote the system as a viable alternative to driving.

CORRIDOR IDENTIFICATION

Several types of corridors were identified for inclusion in the ROSS Plan. These corridors typically have a primary purpose other than non-motorized transportation and intersect arterial streets where many daily destinations, such as



Figure 1-7: The Creamery Branch, an Abandoned Rail Corridor in Tempe.



grocery stores and employers, are located. The MAG region is fortunate to have a variety of linear corridors and rights-of-way which can be utilized in an off-street transportation system by bicycles and pedestrians. These potential corridors form the backbone of a regional off-street system of routes. Other off-street segments may be needed to provide additional connections between origins and destinations. The goals and objectives identified in Section IV help provide guidance on developing other off-street segments. Of particular importance, public lands and existing parkland, such as mountain preserves, can provide vital links in the system. These and other opportunities and constraints should be examined more fully by jurisdictions as they implement the system. Identified corridors include canals, desert washes and waterways, flood control structures and rights-of-way, highway and freeway rights-of-way, railway corridors and utility easements. These corridors are shown in Figure 1-8, Potential Corridor Map.

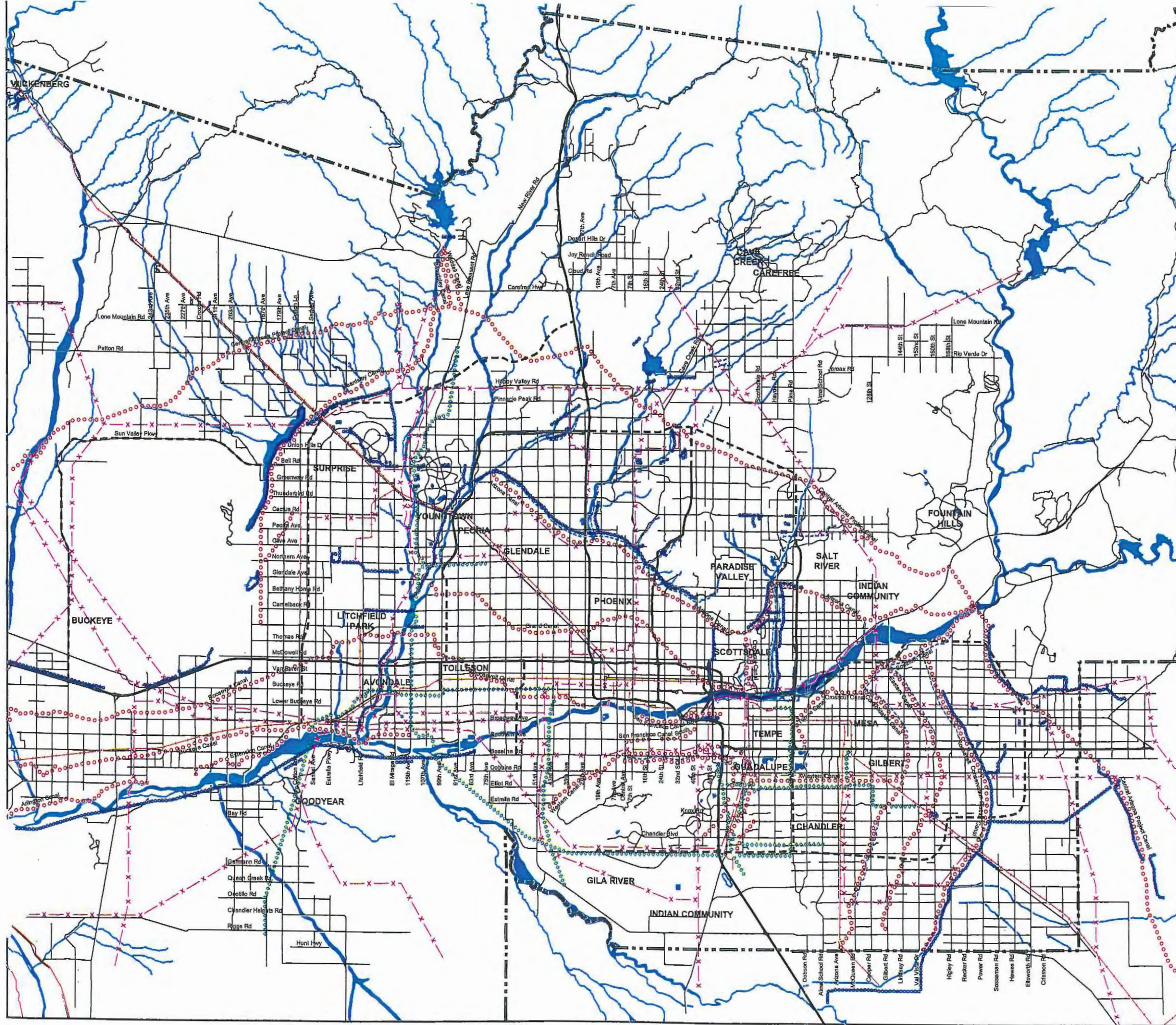
REPRESENTATIVE PROJECTS

To create design guidelines for the ROSS Plan, three representative projects were chosen for their potential to illustrate a variety of issues that might be encountered when developing path/trail systems in the various corridors. These issues include, among others, comfortably crossing busy roadways, creating a user-friendly system when right-of-way is limited and creating paths/trails which complement the primary use of the corridor, such as flood control. For each representative project, an analysis of opportunities and constraints led to schematic drawings illustrating how to appropriately address issues and work within the constraints. Representative projects were chosen to provide a broad range of examples of issues related to the different types of the corridors identified. These three projects included the Dysart Drain, the Creamery Branch rail spur, and the Roosevelt Water Conservation District Canal. Further information can be found in Section VI of the ROSS Plan.



Regional Off-Street System Plan

Potential Corridors



- CANALS
- FLOOD CONTROL PROJECTS
- ◇◇◇◇ GAS LINES
- ×××× HIGH VOLTAGE POWER LINES
- RAILROADS
- RIVER, STREAMS AND DESERT WASHES
- EXISTING PAVED ROUTES WITHIN CORRIDORS
- COUNTY BOUNDARY
- EXISTING FREEWAYS
- PLANNED FREEWAYS
- ARTERIAL ROADS

FINAL DRAFT



MARICOPA ASSOCIATION of GOVERNMENTS



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DESIGN GUIDELINES

Section VII provides basic guidelines to assist MAG member agencies in developing the corridors identified in the ROSS Plan. These guidelines have been developed based upon the analysis of the representative projects and include standards from several sources, including: (1) MAG member agencies; (2) *MAG Pedestrian Area Policies and Design Guidelines*; (3) *MAG Pedestrian Plan 2000*; (4) American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Development of Bicycle Facilities*; (5) *Trails for the 21st Century*; and (6) *Universal Trail Assessment by Beneficial Design*.

Section VII begins with a general discussion of factors affecting path and trail usage, and path/trail user needs. This information is important to consider when designing paths/trails since not all types of users will use all paths/trails. Design guidelines have been divided into two categories. The first category, general design guidelines, applies to all types of off-street corridors. General guidelines have been stratified into the general goal areas of access, safety, connectivity and user-friendly. The second category, specific design guidelines, has been developed to apply to the each of the specific corridor types, such as canal and utility line easements, identified in the ROSS Plan. Only general design guidelines are provided below. Please refer to the full text of Section VII of the ROSS Plan for specific design guidelines.

General Design Guidelines

General Design Guidelines To Ensure Access. The following guidelines will encourage access to the path/trail, and access through and across the corridor. People need convenient access to a non-motorized transportation system to provide a viable alternative to driving. The more convenient the access, the more people will use alternatives to driving alone.

While certain corridor features, such as freeways, roadways, canals and ditches, are opportunities for off-street non-motorized travel, these features can also significantly harm the access to and continuity of an off-street transportation network. Other factors that threaten access are private property and gated communities. A path/trail that welcomes people and allows travel options beyond its own corridor will be well-used and create a pleasant user experience.



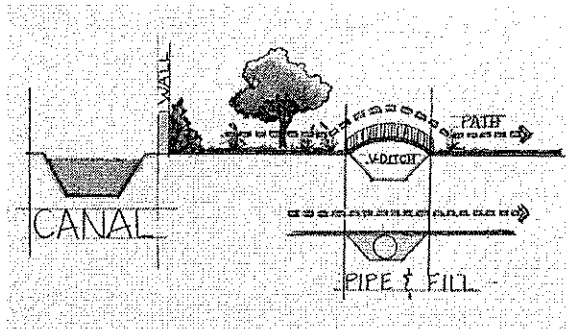


Figure 1-9: Potential Solutions to 'V' Ditches.

Remove, or resolve, obstacles that limit access such as 'v' ditches and fences. Possible options to 'v' ditches include using a prefabricated bridge to cross the ditch, or piping and filling the ditch (see Figure 1-9).

Whenever possible, utilize the entire corridor for non-motorized transportation by providing a path/trail along both sides of a corridor.

Obtain permission for access, or ownership, where a corridor crosses private property. If access is not possible, provide an alternative travel route.

Provide public access points no more than ½-mile apart. If distances are greater between access points, provide access to the path/trail as often as possible.

Encourage local access to paths/trails for nearby residents through cul-de-sac entrances and backyard gates (see Figure 1-10).

Provide regional access for short-term visitors that may not be local and include sufficient parking. Sufficient parking allows access to paths/trails for recreation and also allows longer trips to be partially made by bicycling or walking. Where feasible, parking should also accommodate equestrian users by having pull-through spaces for horse trailers.

Prioritize access to the shared-use path/trail system before land is developed. Consider non-motorized travel needs in neighborhood planning and reserve connections to existing and potential corridors prior to development (see Figure 1-11).



Figure 1-10: Neighborhood Path/Trail Access Through a Cul-de-Sac.



Figure 1-11: Construction of a Shared-Use Path Prior to Site Development.



General Design Guidelines to Ensure Safety. These safety guidelines address both a sense of personal security (also related to user-friendliness) and physical safety concerns from the natural and built environment. Safety is measured in terms of hazardous risks to the body or personal property. Injury can result from either purposeful or accidental events. Particular safety concerns in the potential corridors identified in the ROSS Plan include the possibility of falling electrical wires, drowning, tripping, collisions between cars and persons, and collisions between different user groups, such as bicyclists and equestrians. Some environmental safety issues to be addressed include flooding, lighting, fire and extreme heat. While not all risks can be eradicated, the guidelines provided below describe ways to minimize dangerous conditions for path/trail users.

Establish regular patrols by police or volunteers along paths/trails in corridors and on roadways adjacent to paths/trails. Patrols could be made by bicycle, motor vehicle or horseback. Rural and isolated areas will need particular attention to increase personal security. Criminal incidents are less likely in well-traveled areas with a visible police presence.

Incorporate the path/trail into the neighborhood watch system.

Post signs regarding yield priority, user liability, risks, hazards and upcoming intersections. Provide striping and other surface markings to safely guide users along the path/trail within the corridor and to prevent conflicts between users. Use the *Manual of Uniform Traffic Control Devices* as a reference for signing and striping guidelines.

Provide overhead lighting. The layout of lamps should be consistent, recognizable and unambiguous. Lamp placement should reinforce the direction of travel, reduce glare and minimize dense shadows. Vertical light distribution over paths/trails should cover or overlap at a height of 7-feet (see *Time-Saver Standards*, second edition, 1998, by Charles Harris and Nicholas Dines).

Plants should not be placed in a manner that creates hiding places. A clear zone of three feet should be maintained when measured from a height of three to eight feet. Therefore, shrubs shall be no greater than 3-feet tall and trees shall be limbed up eight feet, or higher. (Taken from the April 2000, Council of Landscape Architectural Registration Boards, L.A.R.E. Reference Manual).



Provide safe mid-block crossings by constructing an overpass, an underpass, a safe crossing with a refuge area, or a crosswalk and signal (see Figure 1-12). It may be necessary to direct path/trail users to an existing signalized street crossing. Refer to the *MAG/City of Tempe Alternative Solutions to Pedestrian Midblock Crossings at Canals* provided in Appendix C to help create safe and comfortable mid-block crossings.

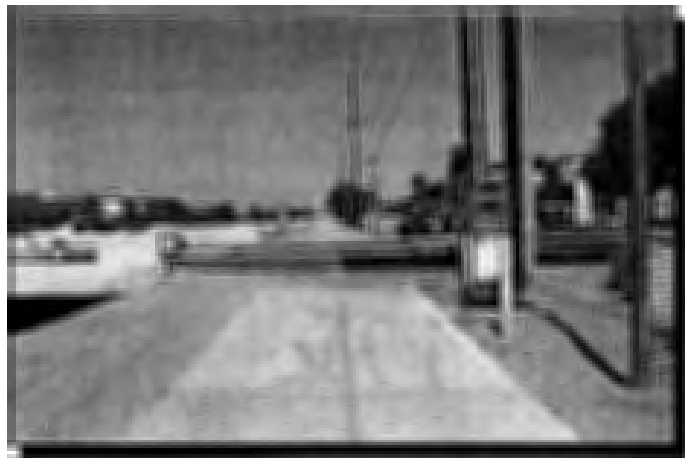


Figure 1-12: A Mid-Block Crossing with Appropriate Signage. Mid-Block Crossing Should be Designed According to the Guidance Provided in Appendix C of the ROSS.

Provide emergency call boxes at approximately 1,000-foot intervals and at all nodes and gathering places. In rural areas, consider the use of solar powered boxes. Where possible, work with local law enforcement agencies and neighborhood watch groups to plan responses to calls. Each phone should identify its address for easy user identification.

Eradicate graffiti on a consistent basis.

Enforce existing local ordinances regarding trash pick-up and disposal of pet waste.

General Design Guidelines to Ensure Connectivity. Connectivity is defined by how the path/trail connects, or is planned to connect, to other corridor types, existing path/trail systems, other forms of transportation, and people to their destinations (see Figure 1-13). Creating a seamless non-motorized transportation system that links origins and destinations is a vital path/trail function. Connecting corridors of different types helps provide continuous off-street routes and provides variety for different users. This general design guideline category provides direction on how each path/trail should relate to its surroundings.

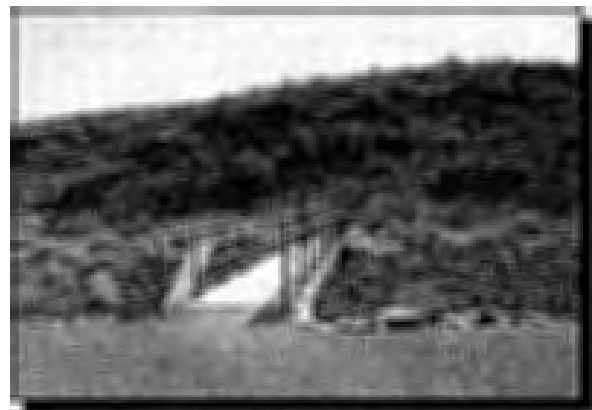


Figure 1-13: Bridges Across Washes, Such as This Bridge Across Cave Creek Wash, Helps Connect People to Destinations.



Connect paths/trails to local destinations such as shopping centers, offices and restaurants, and to regional destinations such as major parks, fairgrounds and employment centers.

To address the problem of terminating corridors, create trailheads where the path/trail has no obvious connections (see Figure 1-14). Alternatively, end the path/trail at a logical destination such as a park, school, employment center or shopping center, or create a path/trail loop which provides access to origins and destinations.

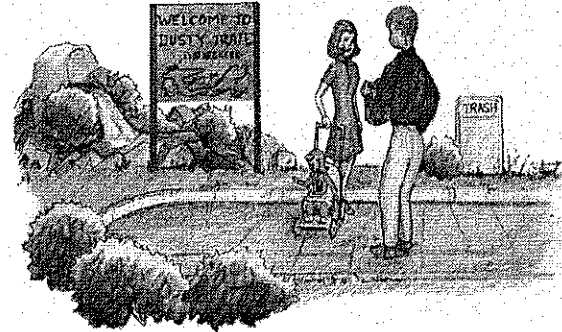


Figure 1-14: To Eliminate the Problem of Terminating Corridors, Change a Termination Point to a Beginning – A Trailhead or Node/Gathering Place.

Provide directional information at all path/trail intersections, nodes and gathering places, and at all logical points of access to the path/trail system.

Link corridor paths/trails to existing and proposed non-motorized transportation systems. Provide for future connections and continuations by land banking, zoning ordinance or other regulatory instrument.

Provide people with multiple opportunities to enter and exit the path/trail. Regional path/trail access points should connect to arterial streets to provide access to on-street travel systems, such as transit, bicycle lanes and sidewalks. The ability for people to easily connect with the off-street non-motorized transportation system will increase the amount of users and their enjoyment of the trail.

General Design Guidelines to Ensure User-Friendliness. This general design guideline category describes design elements that can be used to help people feel comfortable and relaxed. Sociological behaviors can be affected by design of the natural and built environment. While people direct design through placement and construction of various amenities, design can also direct people. Personal comfort is affected by various factors such as air temperature, size relationships, convenience, visual space, noise levels, air quality, security



Figure 1-15: A Rest Area with Appropriate Amenities for Path/Trail and Transit Users in Mesa. Appropriate Amenities Help Create a User-Friendly Non-Motorized Transportation System.



and ability to rest. Increasing personal comfort by creating user-friendly paths/trails results in pleasant user experiences, encouraging future travel choices via bicycling and walking rather than driving.

Plant shade trees to cover at least 50 percent of the path/trail surface for increased user comfort and to provide a human scale to the landscape. If equestrian travel may occur, or where passage height is a concern, this guideline can be adjusted to fit specific situations.

Place signs on shared-use paths/trails with specific yield instructions for users to encourage shared use and cooperation. To minimize user conflict, post information and signs regarding appropriate path/trail use at various places along paths/trails and at activity nodes.

Meet the needs of an aging population and special user groups by incorporating path/trail standards for barrier free access as specified in the Americans with Disabilities Act (ADA guidelines), when possible.

While width will depend on the user mix, shared-use paths/trails should be an average of 10- to 12-feet wide where possible to allow for multiple users with minimal conflict (see Figure 1-16). This width allows two-way bicycle traffic, passing for pedestrians and bicycles, plus a clear distance. A minimum width for two-way traffic, or shared-use, is 8-feet wide with adequate signing and a reduction of speed. This width will accommodate even heavily used paths/trails (20-30 pedestrians per hour, plus the same amount of bicycles). Trail widths may be as little as 4-feet on corridors for short distances, with low anticipated use rates and open visibility, with adequate signing and no adjacent dangers. For additional information on path/trail width, refer to Section VII of the ROSS Plan.



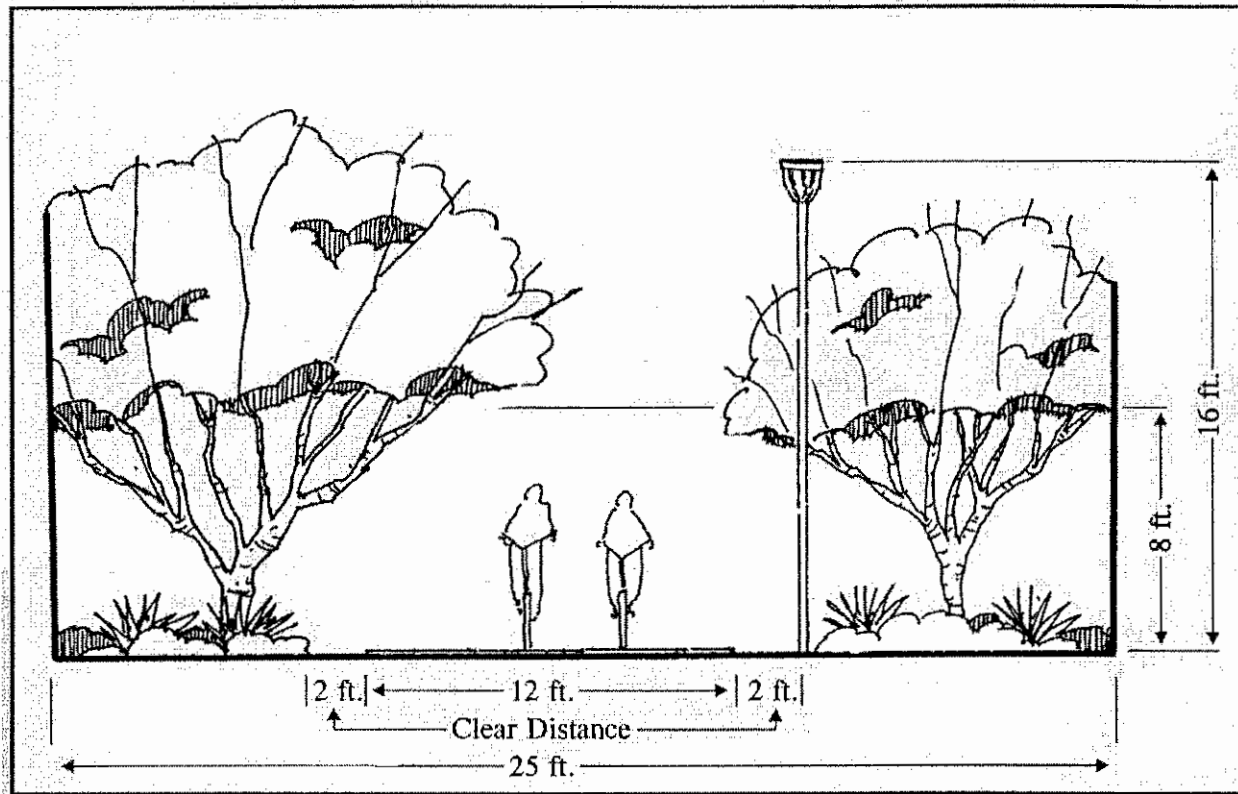


Figure 1-16: Recommended Path/Trail Section, Provided by the Tempe Multi-Use Path System Detailed Plan.

Surface treatment will depend on the user mix. All trail surfaces should be stable, smooth, slip-resistant and firm. The surface material should be free of irregularities and the surface edge should be uniform in width.

When possible, select surface treatments that appeal to a wide range of users, including special populations and equestrians as well as bicyclists and pedestrians. Where corridor width allows, provide both a hard and soft-surface path/trail surface to increase user satisfaction and safety.



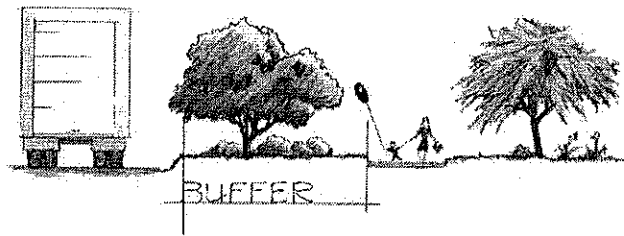


Figure 1-17: Add Separation Buffers Between Users and Unsafe Activities.

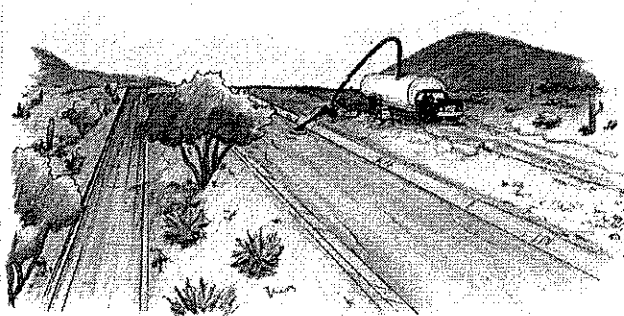


Figure 1-18: When Possible, Keep Operations and Maintenance Activities Separated From Bicyclists and Pedestrians.

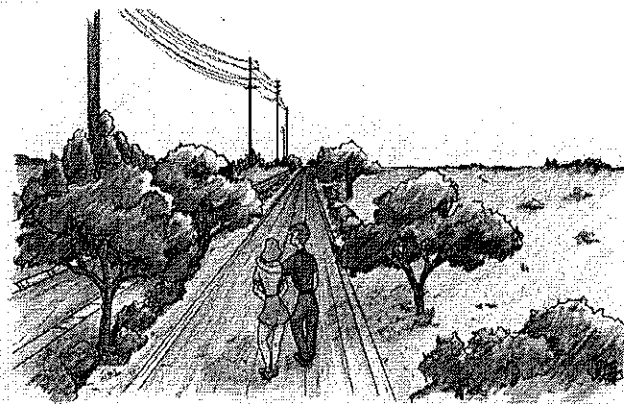


Figure 1-19: Clearly Defining the Pathway Creates a Human-Scaled Environment.

Separate incompatible uses physically by building a fence, wall, curb or planting island between the path/trail and dangerous activity such as fast-moving water, active rail lines or vehicular traffic (see Figure 1-17). If possible, restrict operations and maintenance vehicles to one side of corridor and leave the other side open to path/trail users (see Figure 1-18). Allow sufficient buffer/recovery space for the desired mix of users.

Avoid frequent or drastic changes in grade. However, occasional fluctuations in path/trail grade are desirable to provide variation for path/trail uses and to allow proper drainage.

Clearly define the pathway through unique paving features or landscaping placement to create a human scaled environment (see Figure 1-19).

Establish seating along paths/trails at approximately 500-foot intervals and at all nodes and gathering places.

Accentuate regional views by removing vegetation and other debris that blocks views from the path/trail. Regional views in the MAG area include the adjacent mountains and skyline. Some routes, especially utility easements and canals, may include scenic views of cityscapes.

Screen unsightly views with plants or structures, such as drinking fountains or public art. Changing the orientation or



direction of the path/trail may also be helpful in screening unsightly views.

Post signs that orient people to their surroundings. Identify street names and provide directional information to nearby destinations such as schools and shopping. Mileage markers are also very useful.

Provide bicycle parking at trailheads serving destinations such as shopping malls and retail shops, employment centers and schools. Bike lockers that secure the bike and protect it from the negative effects of weather should be provided at all park-and-ride and transit facilities.

Increase user comfort and help maintain a cleaner path/trail environment with additional site amenities such as drinking fountains, restrooms and trash bins. These amenities should be created especially at nodes and gathering places.

IMPLEMENTATION AND RECOMMENDATIONS

Section VIII provides guidance to MAG member agencies implementing the off-street system. The overarching purpose of the MAG ROSS Plan is to define potential corridors for off-street travel and assist communities in implementing an off-street system of paths/trails for non-motorized travel. Since MAG has 24 member cities and towns, each community will have different community goals and values related to off-street non-motorized transportation. In addition, each community has different amounts of resources and opportunities to develop potential corridors as off-street travel ways. This section is a guide for implementing the system and identifies resources and processes helpful in developing a regional off-street non-motorized transportation system.

The section begins with a general process to develop an off-street non-motorized transportation system (Figure 1-20), including a model ordinance for adoption of the MAG ROSS Plan. This model ordinance is provided in Figure 1-21. Sample evaluation criteria are also included. Implementation issues, such as path/trail opposition, negotiating rights-of-way and easements, working with adjacent property owners, liability and maintenance, are identified and possible solutions are presented. Figure 1-22 identifies rights-of-way, contact information, key issues and potential solutions to consider when developing paths/trails in the corridors identified in the ROSS Plan. This section concludes with recommendations identified as either a "MAG Action" or a "MAG Support" in a manner similar to the MAG *Pedestrian Plan 2000*. These recommendations are listed on the following pages.



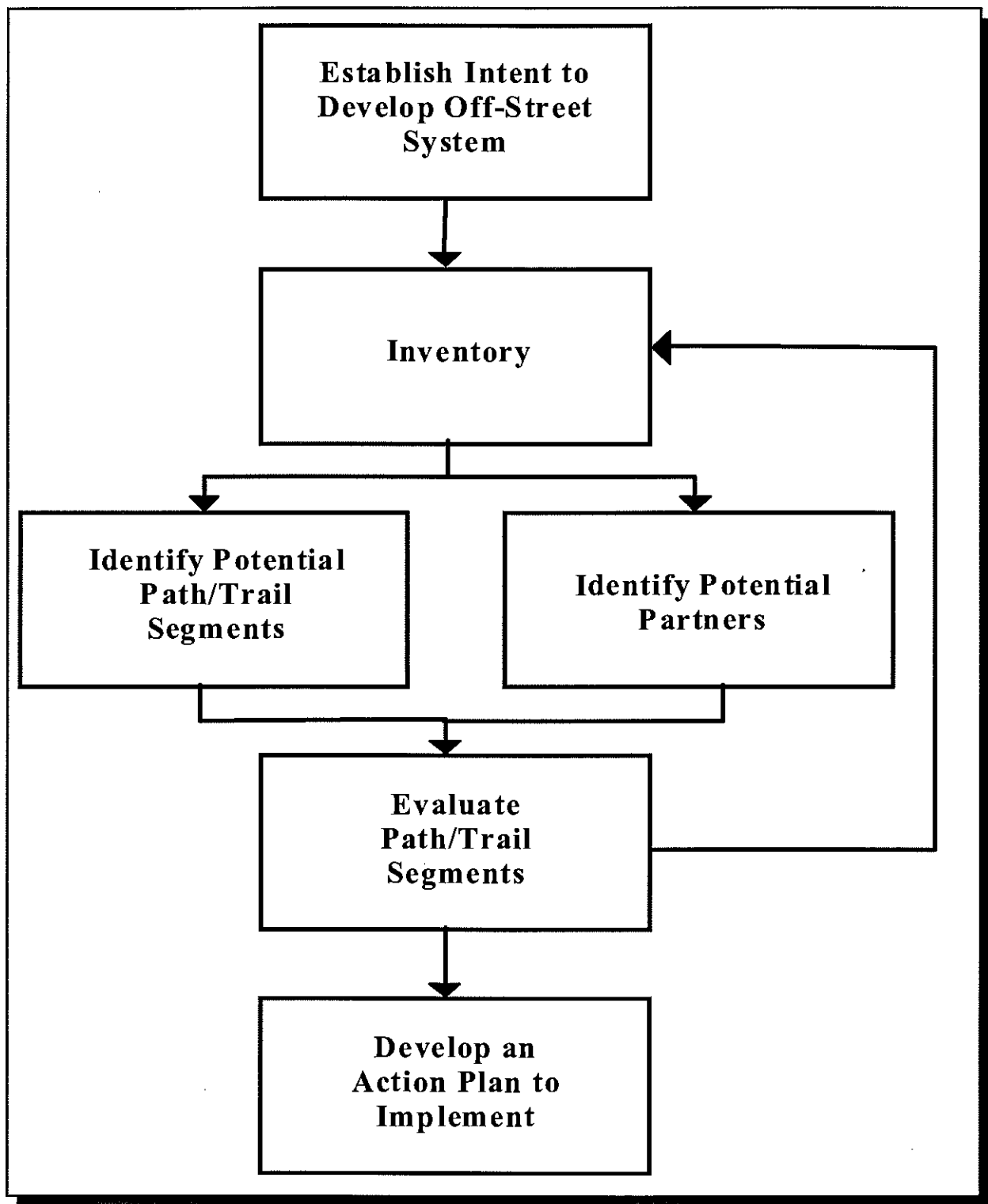
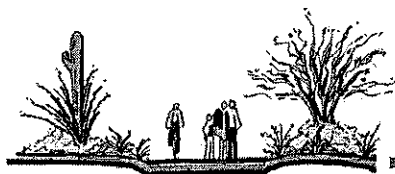


Figure 1-20: General Process to Develop an Off-Street Non-Motorized Transportation System.



CITY COUNCIL ORDINANCE ____ - ____

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF _____ ADOPTING THE SHARED-USE, NON-MOTORIZED TRANSPORTATION PATH/TRAIL SYSTEM WITHIN THE CITY, AS PREPARED BY THE MARICOPA ASSOCIATION OF GOVERNMENTS

WHEREAS, the City of _____ desires to improve regional shared-use, non-motorized path/trail transportation system in accordance with the City's General Plan policies, Section _____; and

WHEREAS, the City of _____ desires to plan a shared-use, non-motorized transportation system that provides a viable alternative to driving for local trips, such as trips to work, school, shopping and leisure activities; and

WHEREAS, the City of _____ desires a shared-use, non-motorized transportation system that provides sufficient, convenient access which is highly visible; and

WHEREAS, the City of _____ desires to develop a shared-use, non-motorized path/trail transportation system that is safe for a variety of users; and

WHEREAS, the City of _____ desires to make appropriate connections that will link origins and destinations using the existing on-street system and other modes of transportation; and

WHEREAS, the City of _____ desires to develop a shared-use, non-motorized path/trail system comprised of paths/trails and amenities that considers the needs of users and potential users; and

WHEREAS, the Community Services Commission, Finance Commission, Transportation Commission and Planning Commission have reviewed this ordinance and upon consideration of the recommendation of the City of _____ staff, have recommended adoption of this ordinance to the City Council;

NOW, THEREFORE, the City Council of the City of _____ DOES HEREBY FIND as follows:

1. That the proposed ordinance will implement the General Plan Goals and Objectives, and result in an improved regional shared-use, non-motorized transportation path/trail system.
2. That the proposed shared-use, non-motorized transportation path/trail system within the City, and recommended guidelines is attached as Exhibit A, and incorporated by this reference.

Figure 1-21: Model Ordinance for Adoption of the ROSS Plan.



3. That the proposed ordinance will implement an improved regional shared-use, non-motorized transportation path/trail system so as continuous connections between major destinations and with adjoining jurisdictions are made within the network.
4. That the proposed ordinance will comply with path/trail design guidelines as identified in the Maricopa Association of Governments Regional Off-Street System Plan to ensure a consistent and cohesive regional shared-use, non-motorized transportation path/trail system throughout the Maricopa Association of Governments region.
5. That pursuant to Section ____ of the City of ____ Arizona Environmental Quality Act procedures and Article ____ of the State Environmental Guidelines, it has been determined that the proposed project will not have a significant effect on the Environment. Thus a negative declaration has been prepared, processed and considered according to the Arizona Environmental Quality Act.

NOW, THEREFORE, the City Council of the City of _____ DOES HEREBY ADOPT the Shared-use, Non-motorized Transportation Path/Trail System Ordinance.

PASSED AND ADOPTED by the City Council of the City of _____ at the meeting held on the ____th day of _____, 20____.

MAYOR OF THE CITY OF _____

ATTEST:

CITY CLERK OF THE CITY OF _____

STATE OF ARIZONA)
COUNTY OF) SS
CITY OF)

I, _____, City Clerk of the City of _____, HEREBY DO CERTIFY that the foregoing Ordinance was duly adopted at the meeting of the City Council of the City of _____ on the ____th day of _____, 20____, by the following roll call vote:

AYES:
NOES:
ABSENT:

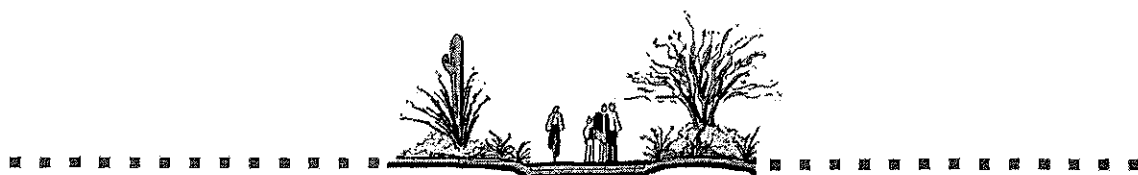
CITY CLERK OF THE CITY OF _____

Figure 1-21: Model Ordinance for Adoption of the ROSS Plan, continued.



Right-of-Way	Contact Information	Major Issues	Solutions
CANALS			
Salt River Project (SRP)	Senior Engineer System Design and Construction	Lacks uniform path/trail development standards	Negotiate on a case-by-case basis
Central Arizona Project (CAP)	Deputy Manager (623) 869-2333	Lack uniform path/trail development standards, liability concern hinders path/trail development	Negotiate on a case-by-case basis, await results of on-going study by Maricopa County Dept. of Transportation
Buckeye Irrigation Company	(623) 386-2046	Liability concern hinders path/trail development	Negotiate on a case-by-case basis
Roosevelt Irrigation District	(623) 386-2046	Liability concern hinders path/trail development	Negotiate on a case-by-case basis
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCDMC)			
	Planning and Project Management Division of the FCDMC, Army Corps of Engineers contact may also be needed	Lack of uniform path/trail development standards, charter prevents construction and maintenance of paths/trails, permitting issues with Corps of Engineers	Aesthetic guidelines exist and are being updated through a master drainage planning process

Figure 1-22: Potential Corridors, Contact Information, Issues and Solutions.



Right-of-Way	Contact Information	Major Issues	Solutions
POWER LINE EASEMENTS			
	SRP or Arizona Public Service	Some rights-of-way are discontinuous due to existing development	Reserve corridors by policy in a general plan
GAS LINE EASEMENTS			
	Southwest Gas, El Paso Gas and/or Black Mountain Gas	Path/Trail may not be possible due to small easement	Construct pedestrian path/trail rather than shared-use
RAILWAY CORRIDORS			
	Burlington Northern Santa Fe, Rails to Trails Conservancy (505) 767-6845	Liability concern prevents path/trails anywhere near working lines	Negotiate on a case-by-case basis where the railway may have excess right-of-way or an abandoned line

Figure 1-22: Potential Corridors, Contact Information, Issues and Solutions, continued.



MAG ROLE*	RECOMMENDATION
<p>*MAG ROLE: Action: A "MAG Action" is a specific course of action designed to achieve an objective implemented by MAG staff or the Regional Bicycle Task Force. This is the "who" of the Goals and Objectives. Support: A "MAG Support" is a specific course of action designed to achieve an objective that is implemented by MAG member agencies and which can be supported by MAG staff and/or the Regional Bicycle Task Force.</p>	
<p>ACCESS GOAL: Provide sufficient, convenient access to the non-motorized transportation system which is highly visible to existing and potential users.</p>	
Support	Encourage MAG members to plan for path/trail access by adopting the MAG ROSS Plan, and by expanding on the ROSS Plan by adding local paths/trails.
Support	Encourage land use patterns which place origin and destination points within reasonable walking and bicycling distance of one another by ensuring an appropriate diversity and mix of land uses in general plans.
Action	Develop a computerized presentation summarizing the key features of the MAG ROSS Plan to present to community groups and organizations interested in bicycle, pedestrian and open space issues.
Action	Develop information on the benefits of paths/trails specifically targeted for landowners and developers, and place this information on the MAG Web site.
Support	Encourage MAG members to plan for path/trail access by coordinating with developers and adjacent land owners during subdivision review processes.



MAG ROLE*	RECOMMENDATION
<p>*MAG ROLE: Action: A "MAG Action" is a specific course of action designed to achieve an objective implemented by MAG staff or the Regional Bicycle Task Force. This is the "who" of the Goals and Objectives. Support: A "MAG Support" is a specific course of action designed to achieve an objective that is implemented by MAG member agencies and which can be supported by MAG staff and/or the Regional Bicycle Task Force.</p>	
<p>SAFETY GOAL: Develop an off-street system of paths/trails that is safe for a variety of users.</p>	
Support	Encourage the implementation of the design guidelines included in the ROSS Plan to ensure the design of shared-use corridors which consider both the original purpose of the corridor and the safe mobility of non-motorized travelers.
Support	Support the expansion of path/trail etiquette resources to provide accurate, consistent and appropriate information to the diverse range of path/trail users.
Action	As appropriate, coordinate path/trail education materials and programs between MAG member agencies to provide consistent messages to non-motorized travelers.
Action	Identify path/trail needs for users not typically addressed in transportation plans, such as roller bladers and equestrians.
Action	Identify the potential feasibility of non-polluting motorized transportation, such as neighborhood electric vehicle (NEV) transportation, along off-street corridors.
Action	Develop Public Service Announcements on path/trail etiquette and the benefits of walking and bicycling.



MAG ROLE*	RECOMMENDATION
<p>*MAG ROLE: Action: A "MAG Action" is a specific course of action designed to achieve an objective implemented by MAG staff or the Regional Bicycle Task Force. This is the "who" of the Goals and Objectives. Support: A "MAG Support" is a specific course of action designed to achieve an objective that is implemented by MAG member agencies and which can be supported by MAG staff and/or the Regional Bicycle Task Force.</p>	
<p>CONNECTIVITY GOAL: Connect origins and destinations with paths/trails, and link paths/trails to the existing on-street transportation system and other transportation modes.</p>	
Action	Develop an annual budget for the publication and distribution of the ROSS Plan.
Support	Encourage jurisdictions to maintain connectivity between bicycle and pedestrian facilities, and other transportation modes and facilities such as transit and park-and-ride lots.
Support	Consider the needs of non-motorized travelers when evaluating subdivision plans.
Action	Create a comprehensive inventory of existing paths/trails to identify gaps in the non-motorized transportation system.
<p>USER-FRIENDLY GOAL: Develop a system of paths/trails that considers the needs of users and potential users ("user-friendly").</p>	
Support	Encourage shared use and cooperation among path/trail users by implementing the design guidelines in the ROSS Plan.
Action	Ensure that all federally-funded non-motorized transportation facilities have amenities appropriate for the targeted user.
Action	Create a comprehensive map of transportation related paths/trails with additional information targeted specifically to user groups. This map may be done in conjunction with the Regional Bikeways Map, or may be a completely separate map.



MAG ROLE*	RECOMMENDATION
<p>*MAG ROLE: Action: A "MAG Action" is a specific course of action designed to achieve an objective implemented by MAG staff or the Regional Bicycle Task Force. This is the "who" of the Goals and Objectives. Support: A "MAG Support" is a specific course of action designed to achieve an objective that is implemented by MAG member agencies and which can be supported by MAG staff and/or the Regional Bicycle Task Force.</p>	
<p>IMPLEMENTATION GOAL: Achieve a truly regional system of off-street paths/trails by assisting MAG member agencies to develop portions of the off-street system that fall under their jurisdiction.</p>	
Action	Widely distribute relevant portions of the ROSS Plan, and specifically target Planning and Zoning departments and Commissions of member agencies.
Support	Encourage MAG members to use the model ordinances outlined in the ROSS Plan to implement a regional interconnected non-motorized transportation system.
Support	Support the interpretation and revision of state legislation and policies to allow use of state transportation funds for pedestrian and bicycle facilities.
Support	Provide coordination between member jurisdictions on open space and multi-modal transportation planning, through formats similar to the Regional Trails Forum meetings, as a way to meet regional path/trail needs, such as continuity along jurisdictional boundaries and path/trail linkage to regional destinations.
Action	Continue funding for a MAG planner to provide support to path/trail users as a vital component of a region-wide multi-modal transportation system.
Support	Promote the formation of regional partnerships between MAG members and private sector agencies to implement the ROSS Plan.



MAG ROLE*	RECOMMENDATION
<p>*MAG ROLE: Action: A "MAG Action" is a specific course of action designed to achieve an objective implemented by MAG staff or the Regional Bicycle Task Force. This is the "who" of the Goals and Objectives. Support: A "MAG Support" is a specific course of action designed to achieve an objective that is implemented by MAG member agencies and which can be supported by MAG staff and/or the Regional Bicycle Task Force.</p>	
Action	Create an Advisory Membership category to the MAG Regional Bicycle Task Force to broaden representation to business groups, homebuilders, special interest groups and those with authority over the corridors identified in the ROSS Plan.
Action	Continue MAG staff and Regional Bicycle Task Force participation in the Long Range Transportation Plan update process and in the development of the Transportation Improvement Program.

FUNDING

Funding for construction of paths/trails is a critical element of implementing a regional system of non-motorized off-street transportation. Several sources of funding are identified in Section IX of the ROSS Plan. There are many sources of public sector (government) funding available for paths/trails, pedestrian and bicycle transportation facilities, such as the Transportation Equity Act for the 21st Century (TEA-21) and Heritage Funds.

Another source of funding is the private sector. Sometimes commercial enterprises are interested in contributing to a path/trail project. These contributions might help increase business access and foot traffic, improve the visual appearance of the business or improve corporate image through a positive community contribution. Neighborhood associations may be interested in funding segments which improve neighborhood access, or they may be interested in creating safety patrols or providing maintenance through "adopt a trail" programs. In addition, developers may be able to construct portions of paths/trails if communities have established the intent to develop an off-street system.



If citizens support path/trails and public funding is lacking, additional new funding opportunities could be sought through community facility districts, general obligation bonds, revenue bonds and/or a transaction privilege/sales tax.



SECTION II: METHODOLOGY

INTRODUCTION

The Regional Off-Street System (ROSS) Plan, initiated by the Maricopa Association of Governments (MAG), reveals a region-wide system of off-street paths/trails for non-motorized transportation. Throughout the MAG region, numerous opportunities for off-street travel by people who walk and bicycle exist along areas such as canal banks, utility line easements and flood control channels. These types of rights-of-way and easements intersect numerous arterial streets where local daily destinations are typically located. The goal of the ROSS plan is to help make bicycling and walking viable options for daily travel trips using off-street opportunities.

The possibility of developing and expanding travel options for people who bicycle and walk and offers many benefits to residents in the MAG region. These benefits include reduced traffic congestion and air pollution from less local trips made by automobile, and improved health and well-being that comes from regular exercise. While not all trips can be replaced by bicycling and walking, many can, such as walking to work or the bus stop, children riding bicycles to school, errands to the grocery or video store and after-school sporting activities.

The ROSS Plan provides guidance to MAG member agencies in creating an off-street, non-motorized transportation system. The Plan focuses on potential corridors that form the backbone of a regional off-street system of routes. Other off-street segments will be necessary to provide additional connections between origins and destinations. The ROSS Plan identifies issues associated with paths/trails and non-motorized transportation, identifies corridors which could be used for paths/trails in the MAG region and provides design guidelines for paths/trails. Creating the plan also helps to provide support for federal transportation funding requests.

BACKGROUND

The MAG Regional Bicycle Plan was adopted by the Regional Council in February, 1992. The Regional Bicycle Plan has been incorporated into the region's Long Range Transportation Plan. A bicycle plan update was approved by the MAG Regional Council in March, 1999. The update revised goals and objectives, changed evaluation criteria for



project selection, enhanced plan maps, updated the funding plan and documented future possible planning activities.

Because the original 1992 plan emphasized on-street facilities, the update also gave limited attention to potential off-street facilities in providing access and mobility for bicyclists. Creating a regional off-street shared-use path/trail plan was identified as an important future planning activity during the plan update. The off-street network was envisioned to include paved paths and unpaved transportation trails. The fiscal year 2000 Unified Planning Work Program and Annual Budget adopted by the MAG Regional Council in May 1999 contains a bicycle component and specifically identifies developing the ROSS Plan.

PLANNING TASKS

RBF Consulting was hired to assist the Regional Bicycle Task Force (RBTF) and Pedestrian Working Group (PWG) to develop the ROSS Plan. In consultation with MAG, the consultant developed a scope of work to complete the ROSS Plan. Key planning tasks are identified and described below. For each task, a working paper was developed to summarize the requested information in each task. For each working paper, an administrative draft was submitted to the MAG project manager for review. Comments from the MAG project manager were incorporated into the draft. Then, each working paper was distributed to the RBTF and PWG for additional review and comment. Several working papers were placed on the MAG web site for additional comment from participants in the Regional Trails Forum meetings. The working papers formed the basis for the final draft ROSS Plan.

Public and Agency Involvement

Public and agency involvement was an important component of each phase of the project. The public involvement plan was designed to involve a wide range of interested parties, including representatives of MAG member agencies interested in transportation and open space planning, interested groups and/or organizations, elected officials, the general public, and groups who could be very involved in the implementation of the plan, including the Salt River Project (SRP) and the Flood Control District of Maricopa County (FCDMC).

The RBTF and PWG played a key role in directing the ROSS. These committees are comprised of representatives of MAG member agencies, the Arizona Department of



Transportation (ADOT), the Regional Public Transportation Authority (RPTA) and the Arizona Society of Landscape Architects. Each month, the committees met and discussed various aspects of the ROSS. Early in the planning process, the RBTF and PWG helped develop a list of stakeholders who may be interested in the ROSS. The developed stakeholder list of approximately 250 persons and organizations includes agencies with a strong role in implementing the ROSS Plan, along with various organizations interested in walking, biking and trail development in the MAG region. These persons met every two to three months during the planning process at the Regional Trails Forum meetings.

Other public outreach methods included the preparation of project newsletters, placement of information on the ROSS on the MAG web site and distribution of press releases for each Regional Trails Forum. Input obtained from the RBTF, PWG and at the Regional Trails Forum meetings helped to shape each of the elements in the ROSS Plan.

Identify Issues

Identification of issues and opportunities helped to provide guidance for the development of a vision statement, goals and objectives for the ROSS Plan. The consultant team developed a list of issues based on conversations with members of the RBTF and PWG, and input from the first Regional Trails Forum held on January 18, 2000. Issues were also identified based on research from the Federal Highway Administration (FHWA). All research was documented and addressed general issues faced by path/trail users.

Develop Plan Vision Statement, Goals and Objectives

Based on the issues identification, the consultant team created a draft vision statement, goals and objectives. The vision statement helps to define the future of off-street, non-motorized transportation in the MAG region. The goals and objectives provide direction to help create the vision of the future. The vision statement, goals and objectives were reviewed and revised by the RBTF, PWG and the MAG project manager. Attendees at the Regional Trails Forum on March 21, 2000 also provided several comments on the draft vision statement, goals and objectives. These comments were incorporated into the draft.

Identify Corridors

Several types of corridors were identified for inclusion in the ROSS Plan. These corridors typically have a primary purpose other than non-motorized transportation and intersect arterial streets where many daily destinations are located. Since each of the corridors are



owned and/or managed by different entities, several methods were used to identify each of the corridors.

Canals. The base mapping for canals was provided by the Maricopa County Department of Transportation (MCDOT). Additional information regarding canals was collected by contacting the individual agencies responsible for them, including SRP, the Buckeye Irrigation Company, the Roosevelt Irrigation District and the Central Arizona Project.

Flood Control Structures and Rights-of-Way. Information on flood control structures and rights-of-way was provided by FCDMC in digital format. The consultant team also interviewed project managers responsible for several ongoing Area Drainage Master Plans.

Utility Easements. SRP provided a map showing showing utility easements for all service providers in the Valley.

Railway Corridors. Information on the location of railway corridors was provided by MCDOT and through internet research. Representatives of the railway companies were also contacted but provided limited information.

Desert Washes and Waterways. Information on desert washes and waterways was provided by the FCDMC.

Highway and Freeway Rights-of-Way. Information on highway and freeway rights-of-way were provided by MCDOT. ADOT drainage basins are not shown on the potential corridor map since this information was not available from ADOT. ADOT should be contacted to determine whether there are drainage basins and/or surplus land available that would be suitable for off-street paths/trails on a case-by-case basis.

Evaluate Corridors

When the scope of work for the ROSS was originally developed, it was envisioned that evaluation criteria would be identified to prioritize corridors for improvements based on the goals and objectives of the plan. Since funding is limited and it is not possible to improve all of the corridors identified during the corridor identification stage of the project, it initially seemed appropriate to evaluate corridors to determine their ability to meet the goals and objectives of the plan. The evaluation criteria could be used to address potential trade-offs between goals and objectives. It was intended that the corridor evaluation would result in a hierarchical system of paths/trails showing the relative importance of each identified corridor segment to the off-street travel system: primary paths/trails that



are critical to attaining plan goals; secondary segments which complement plan goals and tertiary segments which contribute to plan goals.

However, the RBTF and PWG determined that eliminating some corridors from the overall plan was premature. The evaluation criteria were difficult to apply to corridor segments and there was a hesitancy for members of the committee to decide regional priorities based upon information which is continually changing. Furthermore, since the overall goal of the ROSS is to maximize non-motorized travel as a way to improve air quality and relieve congestion, it seemed logical to include as many potential off-street segments in the plan as possible, even if implementation of all potential corridors is unlikely.

Therefore, the evaluation criteria provided in the ROSS Plan provide a framework for MAG member agencies to use in developing project priorities. The criteria can help MAG members to evaluate whether a particular project will meet the goals and objectives in the ROSS Plan.

Create Design Guidelines

Design guidelines were created to address the issues faced by non-motorized travelers. Three representative project sites were chosen for their potential to illustrate a variety of issues that might be encountered when developing path/trail systems in the various corridors. These issues include, among others, comfortably crossing busy roadways, creating a user-friendly system when right-of-way is limited and creating paths/trails which complement the primary use of the corridor, such as flood control.

The first site, the Dysart Drain near Luke Air Force Base, is an example of a flood control facility. This site had unique circumstances dealing with access and property ownership. The second site is an abandoned rail line near downtown Tempe. This site revealed issues related to developing within a rail corridor and midblock crossing issues. The third site is located along the Roosevelt Water Conservation District Canal near Gilbert, Mesa and Queen Creek. This project site had two different types of intersecting corridors. Also, existing activities in the potential travel way could prevent safe and comfortable non-motorized travel.

For each representative project site, an analysis of opportunities and constraints led to schematic drawings illustrating how to appropriately address issues and work within the constraints. Using the results of the analysis of the representative projects, and building upon several established standards for paths/trails, design guidelines were created. Design guidelines were divided into two categories. The first category, general design



guidelines, applies to all types of off-street corridors. General guidelines have been stratified into the general goal areas of access, safety, connectivity and user-friendly. The second category, specific design guidelines, has been developed to apply to the each of the specific corridor types, such as canal and utility line easements, identified in the ROSS Plan.

Develop An Implementation Strategy

To implement the ROSS, the consultant team developed an implementation strategy, including several model ordinances for use by MAG member agencies. Potential criteria for evaluation of possible projects in the ROSS are provided along with several recommendations. Recommendations address a wide range of issues and needs and identify activities for both MAG and its member agencies. In addition, several implementation obstacles are identified and potential solutions are proposed.

Identify Funding Sources

Funding for construction of paths/trails is a critical element of implementing a regional system of non-motorized off-street transportation. Several sources of funding are identified in the ROSS Plan, including federal and private sources. In addition, developers may be able to construct portions of paths/trails if communities have established the intent to develop an off-street system. Two model ordinances were developed to assist in this effort. If citizens support path/trails and public funding is lacking, additional new funding opportunities could be sought through community facility districts, general obligation bonds, revenue bonds and/or a transaction privilege/sales tax. These potential sources of funding are described in the final section of the ROSS Plan.



SECTION III: ISSUES

INTRODUCTION

While specific issues and needs will vary between individual communities and among different types of users, a clear understanding of issues helps to define problems that the planning process should address. Identifying a broad range of issues also helps to define goals and objectives and guides the way to solving issue-related problems. This chapter outlines existing regional trends which contribute to the use of non-motorized transportation, general benefits of bicycling and walking, the importance of the on-road transportation system for bicyclists and pedestrians, and the need for an off-street non-motorized transportation system. The chapter concludes with issues identified through the planning process with the assistance of the Regional Bicycle Task Force (RBTF), Pedestrian Working Group (PWG) and participants in the Regional Trails Forum meetings.

BACKGROUND ON REGIONAL BICYCLE AND PEDESTRIAN PLANNING

On June 9, 1998, President Clinton signed the Transportation Equity Act for the 21st Century (TEA-21) into law. This legislation has numerous provisions which relate to improving conditions for bicycling and walking, and improving safety of the two modes. TEA-21 confirms and continues the principle established in the Intermodal Surface Transportation Efficiency Act (ISTEA): "due consideration" of bicycle and pedestrian travel needs is to be given during the planning, developing, and construction of all Federal-aid transportation projects.

"Due consideration" of bicycle and pedestrian needs should include, at a minimum, a presumption that bicyclists and pedestrians will be accommodated in the design of new and improved transportation facilities. In the planning, design, and operation of transportation facilities, bicyclists and pedestrians should be included as a matter of routine, and the decision to not accommodate them should be the exception rather than the rule...Maintaining access to the transportation system for nonmotorized users is not an optional activity.¹

¹FHWA Guidance on Bicycle and Pedestrian Provisions of Federal Transportation Legislation.



Federal transportation policy goals include increasing non-motorized transportation to at least 15 percent of all trips and to simultaneously reduce the number of non-motorized users killed or injured in traffic crashes by at least 10 percent.

As the metropolitan planning organization for Maricopa County, MAG has been active in promoting the establishment of improved travel opportunities for pedestrians and bicyclists. MAG is charged with developing regional policies and long range plans to address all forms of transportation. MAG is a leader in promoting improvement in the Region's streetside environments to better accommodate pedestrian travel. Past pedestrian planning efforts conducted by MAG and its member agencies have led to a variety of pedestrian-oriented policies, programs and roadway improvements. In 1993, MAG developed a plan which identified policies to encourage walking, and suggested areas where these policies might be best implemented. In 1994, MAG formed the Pedestrian Working Group to promote increased awareness of walking as an alternative mode of travel and to improve facilities for people who walk.

Under the direction of the MAG Pedestrian Working Group, consisting of representatives from MAG member agencies, pedestrian activities continued. In 1994, a survey of pedestrian needs was conducted among residents. Concerns about pedestrian facilities voiced in the survey provided the basis for the development of the 1995 *Pedestrian Area Policies and Design Guidelines*. This document identifies types of pedestrian areas commonly found in the MAG region and proposes policies and design elements to promote walking. In 1995, the Walking into the 21st Century Conference Series was initiated to increase local awareness about pedestrian facility design and the benefits of walking. Since 1996, MAG has provided \$310,000 in Design Assistance funding to develop pedestrian plans and prepare limited construction documents for eight areas in the region. This program has leveraged more than \$3 million of investment in pedestrian facilities since it began.

With respect to bicycling, in 1991, MAG developed a plan to address the needs and concerns of bicyclists in the region, and to encourage bicycling as a way to alleviate congestion and air pollution. The MAG Regional Bicycle Plan was adopted by the Regional Council in February, 1992. The Regional Bicycle Plan has been incorporated into the region's Long Range Transportation Plan. A bicycle plan update was approved by the MAG Regional Council in March, 1999. The update revised goals and objectives, changed evaluation criteria for project selection, enhanced plan maps, updated the funding plan and documented future possible planning activities. Because the original 1992 plan emphasized on-street facilities, the update also gave limited attention to potential off-street facilities in providing access and mobility for bicyclists. Creating a regional off-street shared-use



path/trail plan was identified as an important future planning activity during the plan update. The off-street network was envisioned to include paved paths and unpaved transportation trails.

EXISTING CONDITIONS AND TRENDS

Maricopa County is the fastest growing county in the United States. According to the *MAG Valley Vision 2025 Final Report*, between 1990 and 1997, Maricopa County experienced the largest net increase of any county in the United States by adding 575,000 new residents. By 2025, it is estimated that the region will be home to nearly 5 million people. The region continues to attract residents due to a thriving economy. Between 1980 and 1995, the labor force almost doubled, and the number of jobs is estimated to reach 2.4 million by 2025. In addition, to meet the needs of children in 2025, the following will need to be provided:

- an additional 360 elementary schools,
- an additional 112 middle schools, and
- an additional 80 high schools.

Traffic congestion will continue to grow as well. According to the *MAG Long Range Transportation Plan and 2000 Update (LRTP)*, regional travel is projected to increase approximately 80 percent by 2020. In response to this growth, the MAG LRTP calls for considerable expansion of regional transportation facilities, including:

- an 89 percent increase in freeway/expressway miles,
- nearly a 50 percent increase in street lane miles,
- a tripling of local bus services,
- a quadrupling of express and commuter bus service, and
- a 39 mile light rail transit system.

However, even with these expansions to the regional transportation system, congestion levels are still projected to increase. Building more roadways will not help the problem, either. It is not physically possible to build enough roads to accommodate the additional



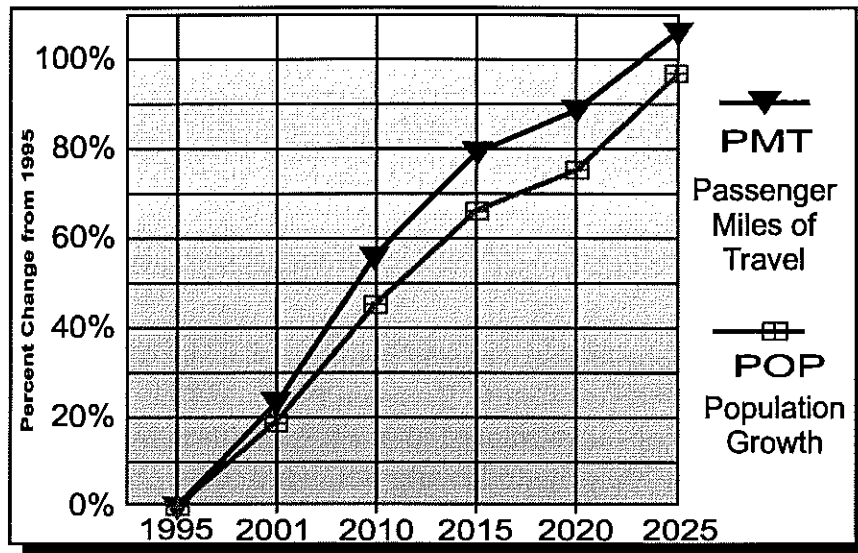


Figure 3-1: Growth in Population and Travel.

traffic if people do not find alternatives to driving to work every day.² Residents are becoming increasingly mobile, and are traveling more miles and making more trips. In fact, one of the reasons why the level of congestion is expected to worsen is because the rate of miles traveled is increasing faster than the rate of population growth (See Figure 3-1). As population increases, the amount of travel is

increasing at an even greater rate. These changes are due to a variety of social and demographic factors, including the increase of women in the workplace, increasing rates of automobile ownership by households and technological changes.

National trends reflect these changes in travel patterns as well. The 1995 National Personal Transportation Survey (NPTS) found that the most common reason for traveling is for family and personal business, which includes shopping and other types of errands. Family and personal business accounts for 46 percent of all person trips and 35 percent of vehicle miles traveled. The next most common type of trip is for social and recreational activities, such as visiting friends or traveling to school or church. Social and recreational trips account for 34 percent of all person trips and 37 percent of vehicle miles traveled. Surprisingly, commuting to work and work-related trips account for only 20 percent of person trips and 27 percent of vehicle miles traveled.

The NPTS also reveals that women make two-thirds of their trips to take someone else somewhere, such as taking children to after school activities. Approximately one-half of school children aged 5 to 15 go to school as passengers in private vehicles and only 10 percent walk to school. Most importantly, approximately 40 percent of all trips are less

² Tim Lomax, Research Engineer, Texas Institute of Transportation, presentation to Phoenix City Council, Winter 2000.



than 2 miles in length. This distance can be easily traveled on a bicycle in 10 minutes or walked in approximately 30 minutes.

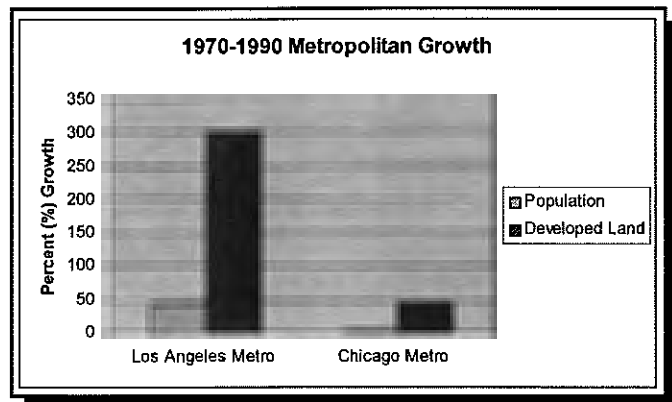


Figure 3-2: Comparison of Population Increase with Land Consumption Increase.

Vehicle miles of travel is also affected by land use patterns and urban form. Figure 3-2 shows a trend toward more land consumption per person. If more land is used per person, destinations and origins are further apart – requiring more travel between origins and destinations and increasing vehicle miles of travel. Figure 3-3 illustrates graphically how urban form has changed in postwar America. The left side of the graphic shows a much more dense, walkable form of development

compared to the lower density car-oriented type of development commonly seen today.³

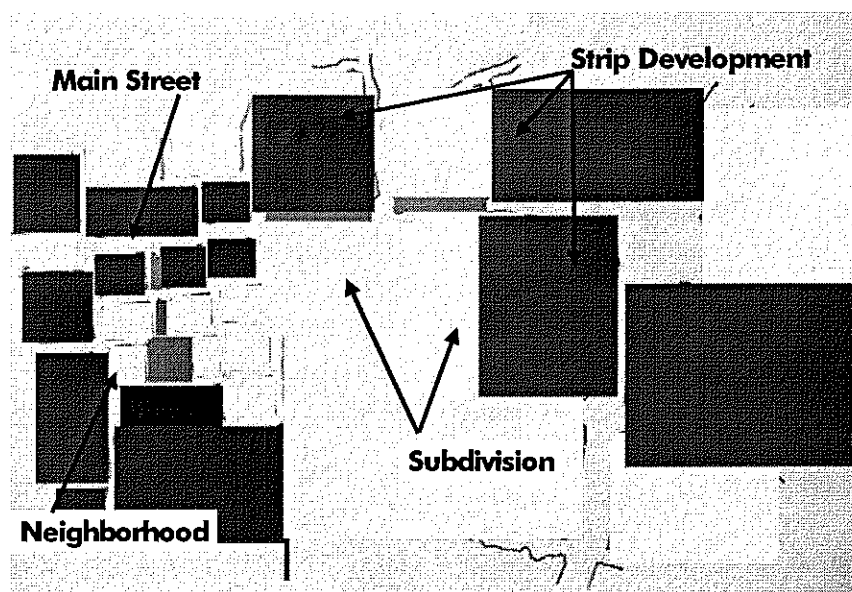


Figure 3-3: Traditional Urban Development Pattern Vs. Current Development Pattern.

³ *Building Livable Communities.* A Report from the Clinton-Gore Administration. Revised June 2000. See <www.livablecommunities.gov>

BENEFITS OF BICYCLING AND WALKING

Since approximately 40 percent of all trips are less than 2 miles in length, bicycling and walking can help relieve roadway congestion if people chose to walk and bike instead of driving for short trips. Bicycling and walking can be practical for all types of trips, such as trips to the grocery store, trips to the video rental store and trips to school. In fact, bicycling and walking offer many health and physical fitness, environmental, transportation-related and economic benefits. Several sources of information have been reviewed to identify benefits of bicycling and walking, and are listed in the bibliography of this document.

Health and Physical Fitness

According to the FHWA National Bicycling and Walking Study, bicycling and walking are ideal forms of exercise to help contribute to meeting national health goals such as reducing the cost of health care. Regular exercise can help manage and prevent a wide range of common diseases including heart disease, hypertension, obesity, diabetes and depression. Physical activity that builds muscle strength and balance can prevent injury as people age. Even small amounts of exercise – such as thirty minutes a day – can have numerous positive effects on mental and physical health.

Environmental

Because bicycling and walking are inexpensive and non-polluting forms of transportation, they can help reduce dependence on petroleum products. Bicycling and walking can replace short distance motor-vehicle trips, which are the most polluting and least fuel efficient types of trips. In the MAG region, encouraging bicycling and pedestrian transportation as an alternative to single-occupant vehicle travel is an approved transportation control measure in air quality plans.

Transportation Related

Roadway improvements which increase the safety of bicyclists, such as adding a paved shoulder to a roadway, can also enhance motorist safety. Because bicycling and walking require less travel space per traveler than motor vehicles, increased use of these transportation modes can reduce the costs of providing new roads and parking.



Special Benefits of Off-Road Paths/Trails

A well-designed system of interconnected paths/trails can create additional non-motorized travel opportunities for those who feel uncomfortable riding their bicycles or walking along busy roadways. The FHWA National Bicycling and Walking Study lists several unique benefits of off-road paths/trails, which are shown in Figure 3-4.

THE IMPORTANCE OF THE ON-ROAD TRANSPORTATION SYSTEM FOR BICYCLISTS AND PEDESTRIANS

The on-road system is important in creating mobility for several reasons as summarized in the *Oregon Bicycle and Pedestrian Plan*. First, because most destinations are located on roadways, providing direct, continuous and convenient access can be best accomplished by considering the needs of bicyclists and pedestrians in roadway design. In existing and developing communities, making bicyclists and pedestrians a part of the existing roadway system by improving the safety and attractiveness of shared roadway space is more cost-effective than developing a separate transportation infrastructure. In addition, TEA-21, which establishes federal policy for transportation, requires "due consideration" of bicycle and pedestrian travel needs to be given during the planning, developing and construction of all Federal-aid transportation projects.

In addition to being cost effective, providing an on-road travel system for bicyclists and pedestrians is also important to help bridge major obstacles, such as rivers, freeways and railroad tracks. Since these features can pose significant barriers to human-powered transportation, incorporating design features into roadway systems specifically for bicyclists and pedestrians, such as dedicated rights-of-way or controlled access crossings, further meets federal goals of increasing bicycle and pedestrian travel.



Transportation. Paths/trails can significantly increase the percentage of bicycling and walking trips, improve safety, increase access and promote intermodal travel.

Recreational. Paths/trails provide an easily accessible outdoor resource for many forms of recreation in addition to bicycling and walking. Healthy People 2000 calls for greatly increased community availability and accessibility of physical activity and fitness facilities to include more miles of hiking, bicycling and fitness paths/trails.

Economic. Off-street paths/trails can produce income from shared utility leases, increase the value of neighboring real estate, generate income from tourists and other users, create jobs for trail development and maintenance and protect existing corridors from development.

Planning Tool. Off-street paths/trails and other greenway corridors promote parkland development, wetland preservation and environmental protection. They preserve undeveloped lands in urban areas and separate and buffer incompatible land uses.

Environmental. Environmental benefits fall into the categories of wildlife preservation, water quality protection, storm water management, preservation of vegetation and other benefits, such as serving as a fire break.

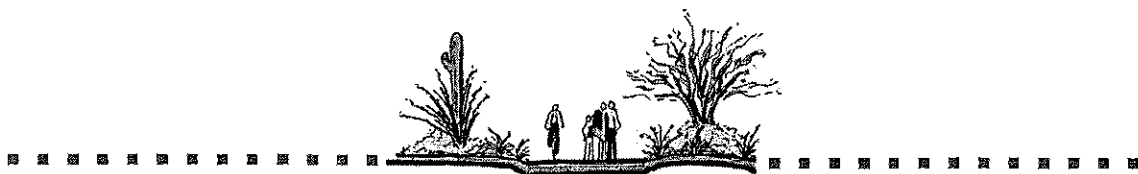
Educational. A path/trail corridor often encompasses several different environments along its route and can be thought of as an outdoor classroom full of educational opportunities. Value is realized by the scientific community, educators and students through a wide range of studies such as biology, history and art.

Historic and Cultural. Off-street paths/trails can educate and increase awareness about the history and culture of a region, aid in the preservation of historic sites and provide a location for cultural events.

Additional Quality of Life Benefits. Increases in the quality of life associated with off-street paths/trails are realized through expressions of community character and pride, aesthetics of the local environment, economic revitalization of the community, access to the outdoors, opportunities for socialization and easy freedom of mobility.

Source: The National Bicycling and Walking Study, Federal Highway Administration, Publication No. FHWA-PD-94-023.

Figure 3-4: Benefits of Off-Street Paths/Trails.



THE NEED FOR AN OFF-STREET SYSTEM

For inexperienced or frail users such as the young and the elderly, walking and bicycling on existing streets can be problematic. High traffic volumes and speeds can be intimidating for people who want to bike and can make them feel uncomfortable enough to limit any attempt to bicycle or walk for shorter trips. Busy intersections and wide streets can be difficult to cross, especially if traffic signals are not timed properly to meet the longer times required by bicyclists and pedestrians. In fact, arterial crossings may not even have a signalized crossing, and there may not be a safe way for bicyclists and pedestrians to cross the roadway to reach a destination.

In addition, existing on-street facilities may be discontinuous, poorly maintained, inadequate, or not available at all. In developed areas, it may be cost prohibitive to retrofit existing roadways to meet the needs of non-vehicle roadway users. In addition, given recent neighborhood land use patterns favoring cul-de-sacs and discontinuous roads, local streets are often disconnected, which requires the pedestrian or cyclist to travel a large distance out of their way to reach a required destination.

REGIONAL ISSUES

Other issues more specific to this region were identified during Regional Trails Forum meetings and are also identified in the *Arizona Trails 2000 State Motorized and Non-Motorized Trails Plan*. Participants in the Regional Trails Forum meetings identified several issues and problems to be addressed during the planning process and to be considered in creating a vision statement, goals and objectives for the plan. The comments voiced and discussed at the meetings have been grouped according to six areas: access, safety, connectivity, user-friendly, implementation and other. In the following paragraphs, efforts have been made to state these concerns as voiced in the meetings. Figure 3-5 summarizes other issues as identified in the *Arizona Trails 2000 State Motorized and Non-Motorized Trails Plan*.



Preferred Trails Designation

Single Activity	6%
Multiple Activities, but Motorized and Non-Motorized Uses Separated	89%
Multiple Activities, but Motorized and Non-Motorized Uses Combined	5%

Preferred Level of Difficulty

Easy	4%	Hard	23%
Moderate	66%	Challenging	7%

Importance of Trail Signs at Specific Locations

At Trailheads	90%	At Washes	24%
At Intervals along the Trail	33%	At Trail Junctions	89%
At Stream Crossings	29%		

Need for This Trail Support Facility

Equestrian Areas	80%	Parking Space	53%
Trail Signs	78%	Remote Camp Sites (Vehicle)	53%
Trailheads / Staging Areas	78%	Drinking Water	51%
Restrooms	73%	Shade Structures/Ramadas	49%
Picnic Facilities	72%	Group Camping Areas	47%
Trash Cans/Dumpsters	68%	Showers	44%
Developed Campgrounds	62%	Shelters/Warming Huts	40%
Remote Camp Sites (Walk-in)	56%	RV Sanitary Dump Station	33%

Source: Arizona Trails 2000 State Motorized and Non-Motorized Trails Plan, October, 1999, Appendix A.

Figure 3-5: Arizona Trails 2000 Survey Responses, Non-Motorized Trails.



Most Important Trails Issues (Choose Only Three)

Lack of Funding for Trails	52%
Lack of Trail Etiquette/Ethics	36%
Loss of Public Access to Trails	36%
Inadequate Trail Maintenance	33%
Erosion/Deterioration of Trails	23%
Too Many Different Users on Trails	15%
Closure of Trails/Roads	11%
Lack of Trails Close to Home	11%
Trails Too Crowded	10%
Not Enough Trails	10%
Too Much Litter and Trash Along Trails	9%
Lack of Directional Signage Along Trails	9%
Lack of Public Support for My Type of Use	9%
Poor Condition of Access Roads to Trails	8%
Not Enough Support Facilities	7%
Too Much Noise Disturbance	6%
Not Enough Good Information	5%
Lack of Government Support for My Type of Use	4%
Lack of Directional Signs to Trailheads	4%
Lack of Barrier-Free Trails for Individuals with Disabilities	2%

Source: Arizona Trails 2000 State Motorized and Non-Motorized Trails Plan, October, 1999, Appendix A.

Figure 3-5, continued: Arizona Trails 2000 Survey Responses, Non-Motorized Trails.



Regional Priorities of Non-Motorized Trail Users for Central Arizona (Phoenix)

- Establish an interagency group between agencies to coordinate regional planning, share resources and present educational information in a consistent manner.
- Develop regional maps that show all trails, connections and contacts across jurisdictions.
- Protect and acquire trail access urban fringes/corridors; utilize Arizona Preserve Initiative.
- Provide trail opportunities close to home.
- Establish an interconnected network of trails throughout the valley; need a regional system.

Statewide Priorities of Non-Motorized Trail Users (meeting held in Phoenix)

- Need to provide more trails close to home.
- New trail development is needed to keep up with citizen demand and growing areas, especially western Arizona.
- Keep existing trails open; this plan should have as its highest priority that Arizonans always have trails to use.
- Develop a trail rating system that identifies level of difficulty and type of use.
- Remain committed to completing the Arizona Trail.

Source: Arizona Trails 2000 State Motorized and Non-Motorized Trails Plan, October, 1999, Appendix A.

Figure 3-5, continued: Arizona Trails 2000 Survey Responses, Non-Motorized Trails.



Access Issues

In the ROSS Plan, it will be important to both identify and link origin and destination points so that the system is used as much as possible. In addition, all paths/trails should be accessible on foot or by bicycle. People need to be able to access the non-motorized transportation system without driving, or benefits to air quality and relieving congestion do not manifest.

Crossing arterial roads is a major issue that must be addressed in this region. Having to cross large roadways is a major obstacle to bicycling and walking.

It will be important to have access points through private property. Purchase of right-of-way to preserve and maintain path/trail access may be necessary. Or, property ownership may be a limiting factor in determining where potential paths/trails can be constructed.

Above all, the non-motorized travel system should be user-friendly, visible and accessible so that it can be used to its full potential. It would be helpful to have a promotional or marketing campaign to tell others about the system, and encourage them to use alternatives to the private vehicle.

Safety Issues

To minimize conflicts between different types of users, educating users about the rules of the system will be important. Signs could be used to accomplish this purpose.

Landowners tend to be overly concerned about liability issues. There may be no reason to be concerned about liability since the Recreational Users Liability Act places most of the onus on the individual for safety. However, this law has not been tested in court.

Connectivity Issues

The system should be truly regional with seamless linkages, even when crossing political boundaries, such as city limits. Path/trail users are not concerned with town and city boundaries; they simply want to access their destination. Connectivity to the bus system and other modes of transportation, such as park-and-ride lots and future light rail, should be a consideration when planning and creating paths/trails. The off-street system should also complement and link to existing and planned on-street systems of bike lanes.



Land use decisions and their role in making walking and biking viable alternatives are very important to consider in the development of the ROSS. First, it may be necessary to reserve some corridors for path/trail use and to maintain access to paths and trails. Second, considering distances between origins and destinations is important. Services, employment centers and residences should be placed near to one another to allow access by bike or on foot. In addition, public facilities such as libraries and community centers, should consider access to paths and trails to allow access to these facilities by non-vehicular means.

User-Friendly Issues

Providing appropriate facilities for a variety of users, ranging from the serious cyclist to families, and including pedestrians and equestrians, will be important. Identifying user expectations and needs should be a priority in the planning process. For example, the need for complementary facilities, such as water fountains, restrooms, bike racks and the like should be identified. Different users sometimes have different needs.

One way to accomplish meeting the need to be “user-friendly” is to encourage a soft path/trail surface next to hard path/trail surfaces to accommodate a wider range of users. Joggers and equestrians often prefer a softer surface, as do those on mountain bikes. The ROSS Plan should be realistic and practical, and trails should be accommodating for a wide range of users. The Plan should address transition between path/trail types, and how to make users feel comfortable using the system.

There should be opportunities for loops in the system. For example, a loop could be formed using the Agua Fria, the Central Arizona Project, the McDowell Mountains and the Salt River. Loops aren’t just for recreation; freeways are designed in loops as well. Loops can help to link a variety of origins and destinations.

In addition, completing gaps in the system is very important to users. Discontinuous paths/trails can pose significant barriers to bicyclists and pedestrians. It will be necessary to discover and create innovative engineering and design solutions to fill in gaps in the system. Gaps can be created by a variety of things, such as political boundaries, arterial roads, freeways and topographic conditions.

A need that is not being addressed by the plan is Neighborhood Electric Vehicle (NEV) transportation. Getting to and from golf courses and other destinations, such as grocery stores, via a NEV is an issue, particularly in the Sun City area. This is also a desire in some communities in the southwestern cities of the region, such as Goodyear and Avondale, for



paths/trails dedicated to NEVs. While the ROSS Plan is focused on non-motorized transportation, examining the need for NEV transportation is also important to consider.

Implementation Issues

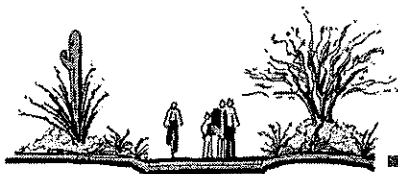
Completing the planned Sun Circle Trail System should be an important priority in the planning process. It will be important to do an inventory of existing city and county path/trail plans and incorporate these past planning efforts into the ROSS development. Links to other counties and throughout the state are important as well, to allow for longer distance non-motorized travel. The MAG *Desert Spaces Open Space Plan* should also be considered as a data source for the ROSS Plan.

The Plan that is developed needs to be supported by all municipalities, stakeholders and the public. Builders need to be aware of how plans may impact their developments so they can participate in the development of the system by setting aside appropriate areas. The plan should be considered from a regional perspective without competition between municipalities. Time should be taken to build consensus among stakeholders, communities and government agencies.

Credibility will be added to the ROSS Plan if it is adopted by the Desert Spaces Task Force. This Plan needs to include the perspective of street engineers as well as recreational professionals and potential users of the system.

The cities and towns in the MAG region should work together to develop funding priorities. That way, there can be regional priorities to maximize funding to the entire region rather than competing as separate cities or agencies. Developing criteria for evaluating plans and prioritizing paths/trails is important to help create a regional, useable system.

Paying for design and construction of the paths/trails included in the ROSS is an important issue. Who will provide funding and where will it come from? There is a need to identify potential funding sources and partnerships to ensure that projects proceed on-time. Potential funding sources/partners include developers, federal grants, business interests and tourism. Could a type of "adopt a trail" program be implemented, to encourage private sector organizations and businesses to construct various trail segments? This plan could be used to help leverage funding. There is substantial funding available through TEA-21 for non-motorized transportation and trails. This Plan could also be used to help change spending priorities to help provide more federal transportation funding for non-motorized transportation.



Developers could pay for portions of pathways when constructing new communities. Cities should be encouraged to adopt model ordinances to have developers provide paths/trails, just as they provide streets and schools. Planning for path/trail systems in advance of development helps to reduce the amount of retrofitting required to create a connected system. Disjointed non-motorized transportation systems with large gaps are not user-friendly because they don't link people to the places where they need to travel. There are currently many fragmented trails that should be incorporated into an overall prioritization strategy for development of the system.

There should be a model standard developed which is flexible enough to be used in a variety of circumstances. Examples of standards include right-of-way widths, trail surface, etc. Having a uniform standard of these features is important so that users have reasonable expectations of how the travel system will function.

Since the Flood Control District of Maricopa County owns much of this right-of-way, it would be helpful if environmental and open space restoration were added to the flood control charter.

Other Issues

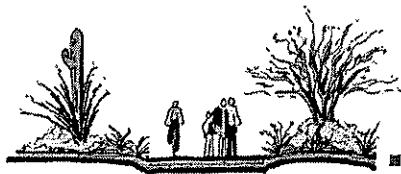
With growth happening so rapidly in this region, it's important to preserve some type of natural environment in urban areas to create a type of oasis for people to enjoy and use. These areas serve a variety of functions, including socialization among community residents and environmental restoration. Nature should not be lost amongst inevitable growth. Preserve as much as possible -- the standard should be to preserve natural environments.

Preparing an inventory of trails would be very helpful for the cities and towns in the region as well as for users. All regional trails maps should be compiled. Paved paths and unpaved trails should be shown separately on the map. The map should be produced in data layers in a GIS format to allow building upon the map for the needs of individual cities.

Stakeholders identified who should be involved in future Trails Forums include private landowners, the State Land Department, a representative from the Central Arizona Project, the Forest Service, the Bureau of Reclamation, Valley Forward, Valley Partnership, land trusts, the Mountain Bike Association, equestrian groups, representatives from the railroads and the Arizona Department of Transportation.



Language can be important. Sometimes pathways fall under municipal departments that deal with streets, not parks, whereas trails are usually under a parks and recreation department. It is important to differentiate between the definitions of "path" and "trail." Trails are usually unpaved while paths are usually paved.



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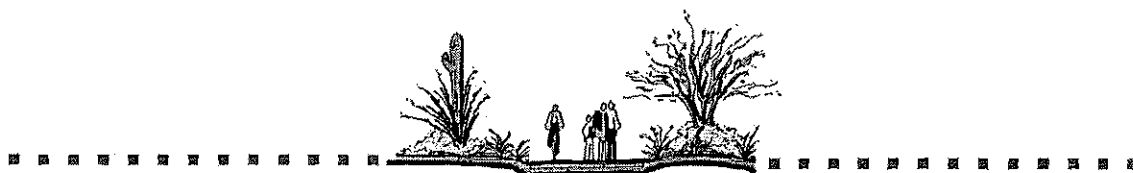


SECTION IV: VISION STATEMENT, GOALS AND OBJECTIVES

INTRODUCTION

This section of the Maricopa Association of Governments (MAG) Regional Off-Street System (ROSS) Plan presents a vision statement, goals and objectives for the ROSS Plan. The vision statement, goals and objectives were developed in consultation with the MAG Regional Bicycle Task Force (RBTF), Pedestrian Working Group (PWG) and participants in the Regional Trails Forum meetings. The vision statement paints a picture of the future once the Plan is implemented and helps define the future of the regional off-street non-motorized transportation system.

The five key issue areas defined in Section III provide the framework for the goals and objectives. The goals address the five issue areas of access, safety, connectivity, user-friendly and implementation, and provide guidance to MAG and its member agencies in making bicycling and walking viable options for daily travel trips. Replacing single-occupant motorized vehicle trips with bicycling and walking helps to improve air quality and relieve congestion. Each goal lists a number of objectives which are more specific measures to help achieve each of the goals.



VISION STATEMENT

Residents of the MAG region have safe, convenient access to an attractive, shared-use, non-motorized transportation system that provides a viable alternative to driving for local trips, such as trips to work, school, shopping and leisure activities.



Figure 4-1: Visions of a Non-Motorized Transportation System.

ACCESS GOAL

Provide sufficient, convenient access to the non-motorized off-street transportation system which is highly visible to existing and potential users.

Objectives:

- Use design guidelines identified in the ROSS Plan, such as unique landscaping and special signs, to make path/trail access points more visible to existing and potential users.
- Alleviate, or remove, barriers to non-motorized travel by implementing the design guidelines and recommendations included in the ROSS Plan.
- Design an off-street path/trail system that provides a sufficient number of access points to provide access to numerous users.



- Whenever possible, ensure that design of off-street paths/trails meets or exceeds the Americans with Disabilities Act (ADA) Design Guidelines.
- Encourage land use patterns which place origin and destination points within reasonable walking and bicycling distance of one another.

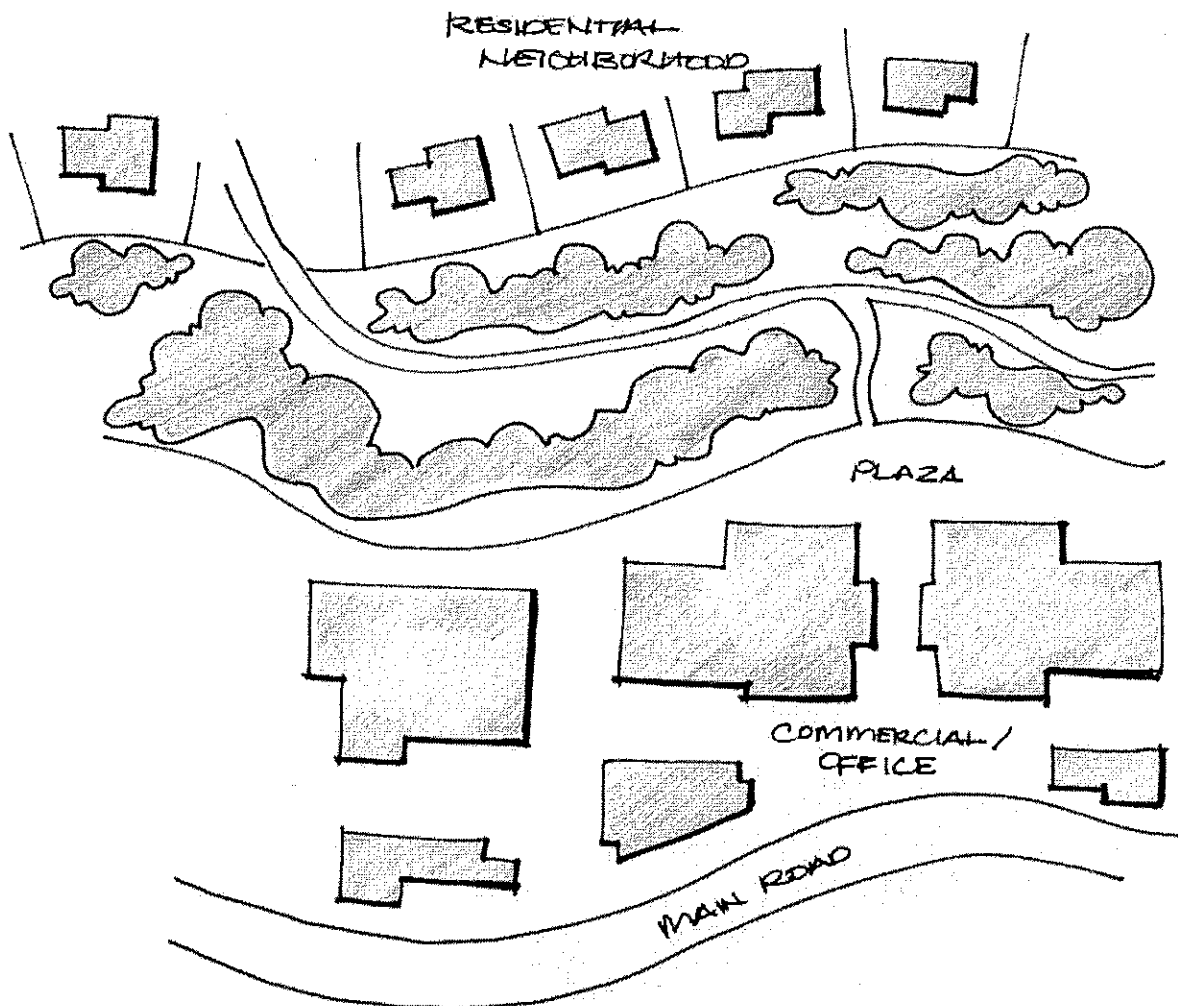


Figure 4-2: Residential Area Linked to Commercial/Office Space Using an Off-Street Route.



SAFETY GOAL

Develop an off-street system of paths/trails that is safe for a variety of users.

Objectives:

- Design paths/trails within multi-purpose corridors to meet the needs of non-motorized travelers without infringing on the original purpose of the corridor.
- Use Crime Prevention Through Environmental Design (CPTED) techniques to address personal safety concerns (see Appendix A).
- Improve safety of users through design guidelines that regulate appropriate distance from and access to dangerous features, such as fast-moving water or sand-and-gravel pits.

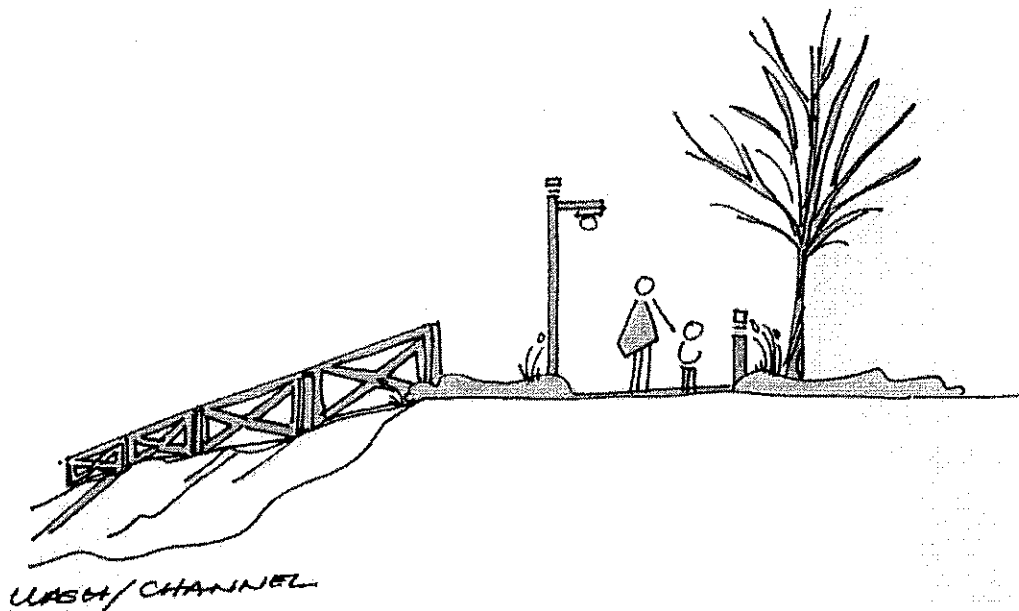


Figure 4-3: Locating Paths/Trails Far Enough From the Bank Edge Assures User Safety.

- Promote the adherence to nationally and regionally accepted design guidelines in the development of paths/trails, including the American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Development of Bicycle*



Facilities, the Manual of Uniform Traffic Control Devices (MUTCD), the MAG Pedestrian Plan 2000, the MAG Pedestrian Area Policies and Design Guidelines and the ROSS Plan.

CONNECTIVITY GOAL

Connect origins and destinations with paths/trails, and link paths/trails to the existing on-street transportation system and other transportation modes.

Objectives:

- Connect origins and destinations with continuous and direct off-street routes to encourage non-motorized travel.
- Develop design guidelines in the ROSS Plan to minimize barriers to riding a bike or walking along paths/trails.
- Provide grade separations to maintain connectivity of paths/trails over barriers such as freeways and high-speed, highly-traveled roadways.

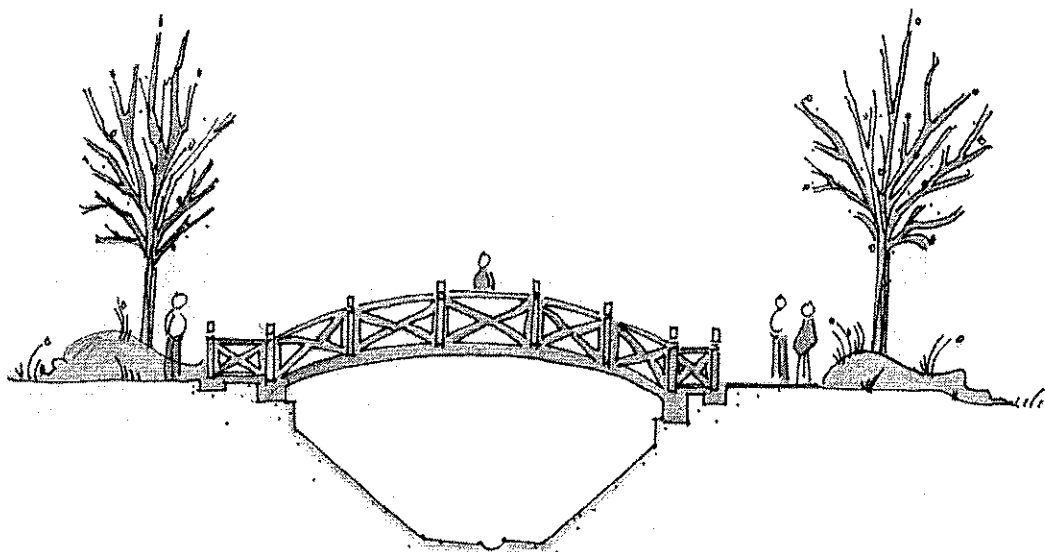


Figure 4-4: It May Be Necessary to Cross Barriers, Such as this Waterway, to Make Appropriate Connections for Non-Motorized Travelers.



- When grade separated crossings are not feasible, use *Alternative Solutions to Pedestrian Mid-Block Crossings at Canals* to provide guidance for at-grade crossings, prepared for MAG in association with the City of Tempe in 1999 (see Appendix C).
- Link the off-street non-motorized transportation system with the on-street system (such as bicycle lanes and wide outside lanes along arterial streets) and other modes of transportation (such as bus routes, light rail and park-and-ride lots) to optimize opportunities for travel by bicyclists and pedestrians.
- Identify obvious gaps in the existing system of off-street paths/trails and develop methods to eliminate these gaps thereby encouraging bicycling and walking.

USER-FRIENDLY GOAL

Develop a system of paths/trails that considers the needs of users and potential users (user-friendly).

Objectives:

- Design attractive and appropriate facilities based upon user needs, surrounding land uses and community character.
- Provide an appropriate level of amenities to meet user needs, such as drinking fountains, rest areas, signage, lighting, shade and sufficient bicycle parking.
- Minimize conflicts between users by employing guidelines identified in the MAG ROSS Plan.
- Maintain pathways to achieve a pleasant and safe travel experience.

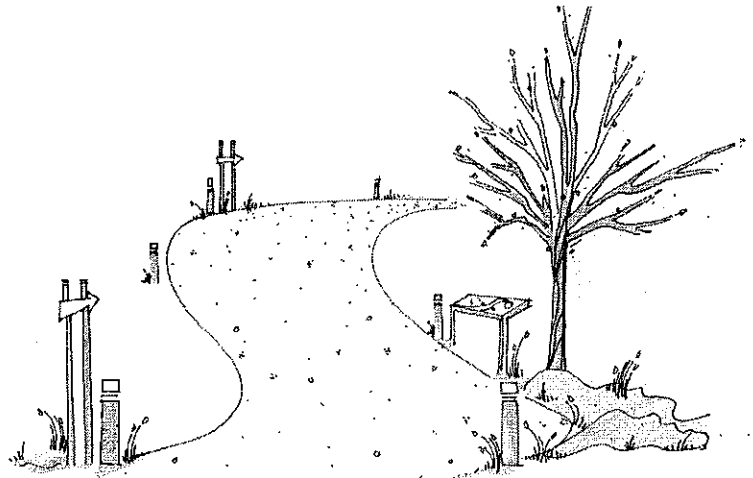
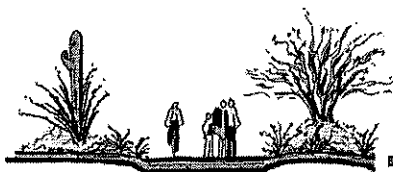


Figure 4-5: A User-Friendly Path/Trail.



IMPLEMENTATION GOAL

Achieve a truly regional system of off-street paths/trails by assisting MAG member agencies in developing portions of the off-street system under their jurisdiction.

Objectives:

- Create partnerships with private and public sector organizations to encourage the development of non-motorized transportation facilities that will meet the needs of the community without infringing on the original purpose of the right-of-way.
- Encourage funding of projects which provide off-street travel opportunities in areas where expansion or retrofit of on-street facilities is cost prohibitive.
- Identify potential solutions to resolve issues associated with developing paths/trails in corridors and rights-of-way, such as operations and maintenance, in the ROSS Plan.
- Develop flexible design guidelines to address circumstances that may be encountered when developing in rights-of way with size or policy constraints.
- Develop a model ordinance for MAG member agencies to incorporate into planning and review processes for developer provision of easements and development of critical pathway segments.
- Consider and identify creative ways and approaches to implementing the system, such as shared use agreements, model ordinances and shared funding opportunities.
- Promote the system as a viable alternative to driving.



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SECTION V: CORRIDOR IDENTIFICATION

INTRODUCTION

This section of the ROSS identifies potential corridors for inclusion in the Plan. Several types of corridors were identified for inclusion in the ROSS Plan. These corridors typically have a primary purpose other than non-motorized transportation and intersect arterial streets where many daily destinations, such as grocery stores and employers, are located. The MAG region is fortunate to have a variety of linear corridors and rights-of-way which can be utilized in an off-street transportation system by bicyclists and pedestrians. These potential corridors form the backbone of a regional off-street system of routes. Other off-street segments may be needed to provide additional connections between origins and destinations. The goals and objectives identified in Section IV provide guidance on developing other off-street segments. Of particular importance, public lands and existing parkland, such as mountain preserves, can provide vital links in the system. These and other opportunities and constraints should be examined more fully by jurisdictions as they implement the system.



CANALS

There are hundreds of miles of canals within the MAG region (see Figure 5-1). Most of the Valley's canals are operated by the Salt River Project (SRP), and the operations and maintenance (O & M) roads along these canals are open for non-motorized recreational travel. Most of these O & M roads are already in use as informal trails, and some are formal trails, such as the Sun Circle Trail. Therefore, canals are particularly good candidates for an off-street path/trail system. In addition, as seen in Figure 5-2, the Potential Corridor Map, canals intersect numerous arterials, which provides non-motorized access to daily destinations. Making short trips by bicycle or afoot can improve air quality and congestion if replacing a trip made by motor vehicle.



Figure 5-1: Typical Canal in the MAG Region.



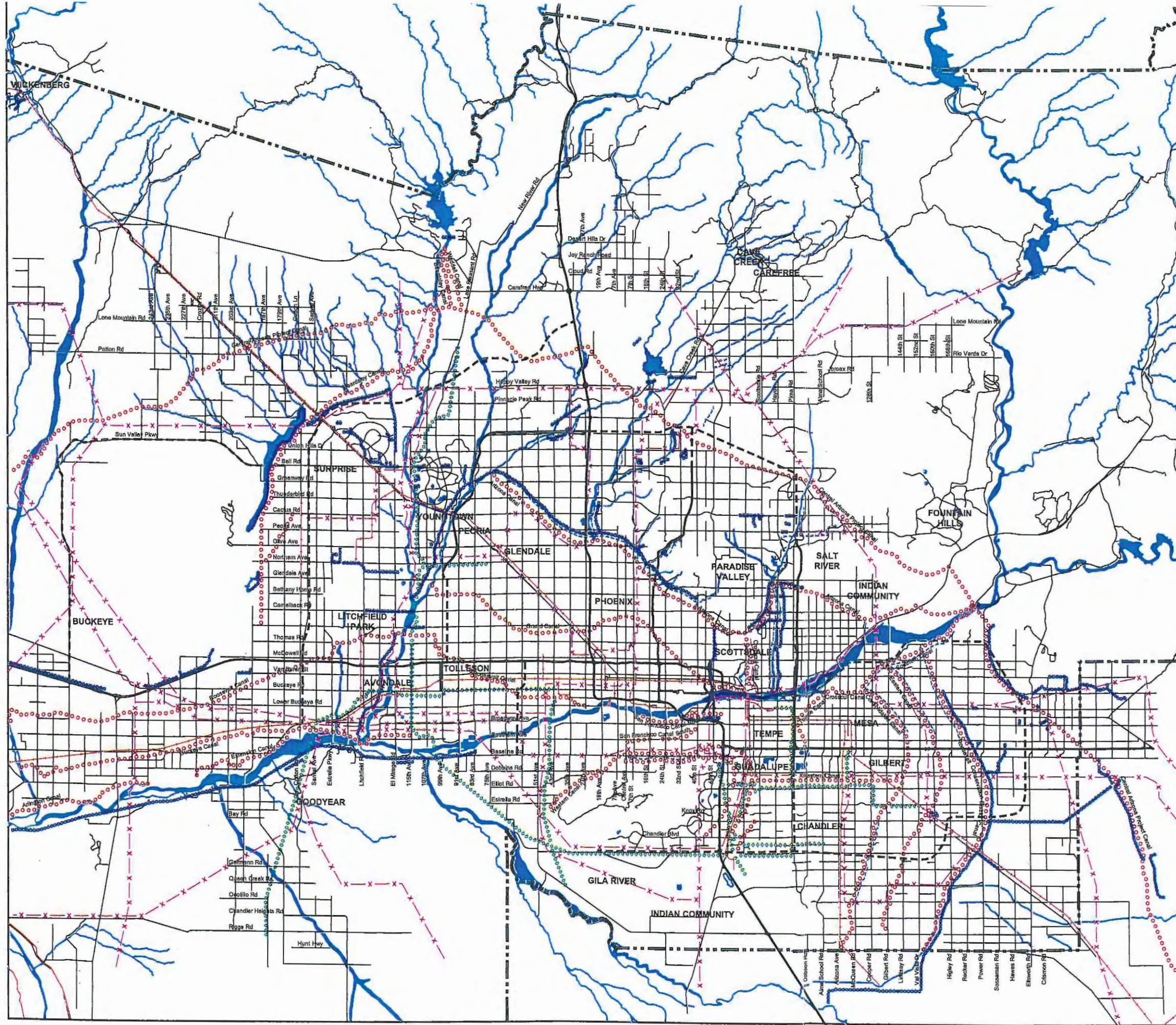
Figure 5-3: Access to Canal Path/Trail From Residential Development.

Canals can also be attractive water features that provide opportunities for rest and respite in an increasingly crowded urban area. In the MAG region, there are examples, such as the one shown in the Figure 5-3, where residential development has taken advantage of frontage along a canal by providing views and access to the canal right-of-way. Incorporating canals into an off-street system is cost effective since a pre-existing path/trail already exists.



Regional Off-Street System Plan

Potential Corridors



- CANALS
- FLOOD CONTROL PROJECTS
- ◇◇◇◇ GAS LINES
- ×××× HIGH VOLTAGE POWER LINES
- RAILROADS
- RIVER, STREAMS AND DESERT WASHES
- EXISTING PAVED ROUTES WITHIN CORRIDORS
- COUNTY BOUNDARY
- EXISTING FREEWAYS
- PLANNED FREEWAYS
- ARTERIAL ROADS

FINAL DRAFT

NORTH
NOT TO SCALE

MARICOPA ASSOCIATION of GOVERNMENTS

RBF PLANNING • DESIGN • CONSTRUCTION
CONSULTING

18805 NORTH 25th AVENUE, SUITE 100
PHOENIX, ARIZONA 85033-7550
602.487.2200 • FAX 602.487.2201 • www.RBF.com

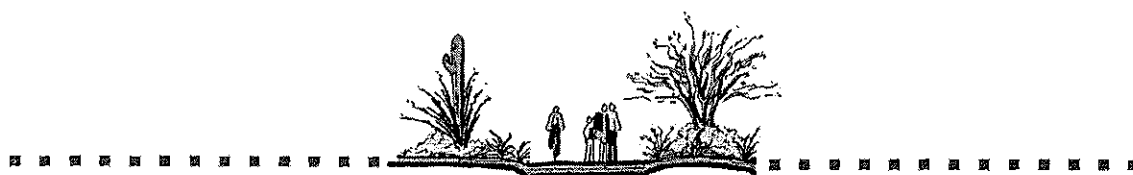
DESERT WASHES AND WATERWAYS

Desert washes and waterways provide many opportunities for path/trail development. In fact, there are projects underway along the Gila and Agua Fria rivers which propose combining restoration of riparian habitat efforts with recreational amenities and path/trail systems. The Rio Salado Project and the West Valley Rivers Project are well known examples.



Figure 5-4: Agua Fria River, with the Potential for Restoration of Environmental Habitat and Multi-Modal, Non-Motorized Travel.

These types of corridors present tremendous opportunities for non-motorized travel because they will provide linkages to a wide variety of local and regional destinations. The Indian Bend Wash in Scottsdale is an example of a shared-use path that provides non-motorized access to many destinations. Developing paths/trails in these corridors will require the cooperation of a variety of jurisdictions, such as cities and towns, and public agencies responsible for water management, such as the Bureau of Reclamation and the Flood Control District of Maricopa County. The issues of coordination is addressed further in Section VIII and Appendix B of the ROSS Plan.



FLOOD CONTROL STRUCTURES AND RIGHTS-OF-WAY

The Flood Control District of Maricopa County (FCDMC) is currently developing several Area Drainage Master Plans and studies. These watercourse master plans focus on protecting the public from the hazards of flooding, while simultaneously providing the opportunity to integrate open space and recreation uses with floodplain management. As part of the planning process, the FCDMC is examining potential partnership opportunities with cities and towns to help create shared-use facilities suitable for bicycling, walking and recreational uses.



Figure 5-5: Thunderbird Paseo Park, a Structure Managed by the Flood Control District of Maricopa County.

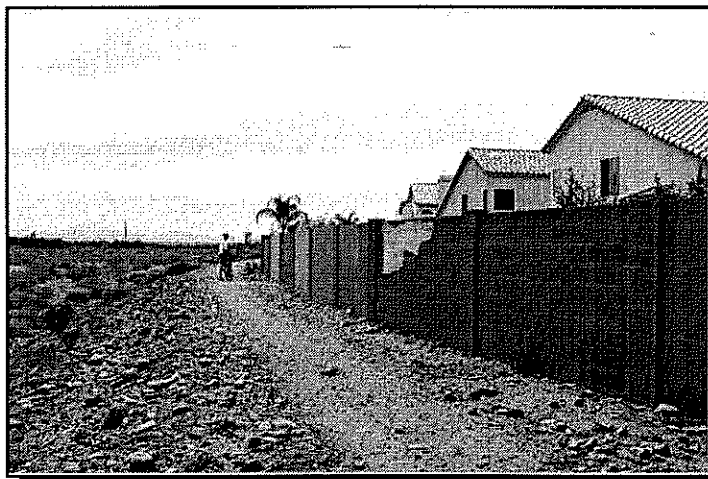


Figure 5-6: The West Valley Rivers Project, sponsored by the Flood Control District of Maricopa County and MAG, offers Non-Motorized Travel Opportunities along the New River and Agua Fria River.

For example, MAG, in partnership with the FCDMC, is managing the West Valley Rivers Project – a study to develop a 42-mile path/trail system along the New River and Lower Agua Fria River. The MAG effort is being integrated with the Agua Fria Watercourse Master Plan. Previous partnership efforts which demonstrate FCDMC's commitment to shared-use facilities include the Thunderbird Paseo Park, shown in Figure 5-5 and Indian Bend Wash. There are also other examples of these types of facilities and partnership efforts throughout the MAG region.

HIGHWAY AND FREEWAY RIGHTS-OF-WAY



Figure 5-7: Path along a Freeway Sound Wall in Scottsdale.

Highway and freeway rights-of-way include off-street corridors along drainage channels and sound walls. A path placed in these types of corridors would be screened and buffered from high-speed traffic while maintaining access to destinations. These types of corridors can help provide vital links where sufficient right-of-way exists or can be obtained. At this time, there is not data available on how much right-of-way along highway and freeway corridors is available for use as paths/trails. However, the potential to

make these types of facilities multi-modal amenities for the community does exist, as shown in the example in Figure 5-7. However, as freeways and highways are designed and constructed in the MAG region, it will be important to consider the opportunities for paths/trails in these types of corridors on a case-by-case basis.

RAILWAY CORRIDORS

Both active and inactive railway corridors were identified as potential corridors although inactive rail lines are more suitable for comfortable shared-use paths/trails. Active and inactive rail lines are distinguished on the Potential Corridor Map (Figure 5-2). Although in most cases there is not enough right-of-way to develop a path/trail in conjunction with an active rail line, there have been cases where there is sufficient right-of-way to safely accommodate a path or shared-use trail. Whether sufficient right-of-way exists should be examined on a case-by-case basis as the ROSS Plan is implemented.



Figure 5-8: The Creamery Branch, an Abandoned Rail Corridor in Tempe.



UTILITY EASEMENTS

Utility easements, such as high voltage transmission lines and gas lines, have the potential to serve a dual purpose and become paths/trails. There are also opportunities for utility easements to provide links to paths/trails in other types of corridors. For example, Figure 5-9 shows a utility easement intersecting a canal.

The Potential Corridor Map (Figure 5-2) shows high voltage transmission lines easements carrying 230 kilovolts (kv) or more, and gas line easements for the El Paso Natural Gas Company.

When compared with smaller easements, larger power line easements have the most potential for use as travel routes since there is sufficient right-of-way available to construct a comfortable path/trail. While easements with less width may be appropriate for some path or trail development, the ability to construct a comfortable path/trail needs to be determined on a case-by-case basis.



Figure 5-9: High Voltage Power Line Intersecting with the Arizona Canal.



SECTION VI: REPRESENTATIVE PROJECTS

INTRODUCTION

To create design guidelines for the ROSS Plan, three representative projects were chosen for their potential to illustrate a variety of issues that might be encountered when developing path/trail systems in the various corridors. These issues include, among others, comfortably crossing busy roadways, creating a user-friendly system when right-of-way is limited and creating paths/trails which complement the primary use of the corridor, such as flood control. For each representative project, an analysis of opportunities and constraints led to schematic drawings illustrating how to appropriately address issues and work within the constraints. Representative projects were chosen to provide a broad range of examples of issues related to the different types of the corridors identified. These three projects, and the issues identified, are described in this Section. Potential solutions are identified in the next Section of the ROSS Plan, Design Guidelines.

DESCRIPTION OF REPRESENTATIVE PROJECTS

Dysart Drain



Figure 6-1: The Dysart Drain Representative Project.

The Dysart Drain is a flood control structure along Northern Avenue between Reems Road and Litchfield Road, just north of Luke Air Force Base and near the Town of El Mirage in Maricopa County. Key issues revealed during the analysis included access and property ownership. These issues and other opportunities revealed during visits to the site are described later in this section.



Creamery Branch

The Creamery Branch rail spur is an abandoned rail line in Tempe near the downtown area and Arizona State University (ASU). The spur runs east-west from the intersection of University and McAllister, nearly to McClintock Road. Numerous destinations are located in the study area, including Arizona State University and Tempe Town Lake. This site was selected as a representative project to identify issues that may arise when developing paths/trails in railway corridors.



Figure 6-2: The Creamery Branch Representative Project.

Roosevelt Water Conservation District Canal



Figure 6-3: Roosevelt Water Conservation District Canal Representative Project.

The third representative project was the Roosevelt Water Conservation District Canal, which is near Mesa, Gilbert and Queen Creek, between Germann Road and Ray Road. A canal, flood control structure, railway crossing and utility line easement are all within the study area. This project is just west of Williams Gateway and ASU West, which used to be Williams Air Force Base.

ANALYSIS OF ISSUES AND OPPORTUNITIES

Dysart Drain

A site visit to the Dysart Drain revealed several opportunities which are available in all the different types of potential corridors identified in the ROSS Plan. Figure 6-4 shows



Figure 6-4: Visual Appeal Near the Dysart Drain.



the remarkable visual appeal in the area. The Drain also links to the Agua Fria River where current studies by the Flood Control District of Maricopa County (FCDMC) are identifying potential path/trail locations integrated with operations and maintenance (O & M) roads. The Drain also provides views of the White Tank Mountains, a scenic feature in the Region. Also near the Drain is a rail line (see Figure 6-5), presenting an opportunity for future multi-modal transportation.



Figure 6-5: An Opportunity for Multi-Modal Connections Near the Dysart Drain.

An analysis of the Dysart Drain also presented two notable issues: property access and property ownership. As shown in Figures 6-6 and 6-7, the canal corridor is located behind a fence on Luke Air Force Base. Because unauthorized public access is not permitted to the Base, the potential travel opportunity is threatened.



Figure 6-6: No Unauthorized Public Access is Allowed to Luke Air Force Base.



Figure 6-7: The Travel Opportunity (Dysart Drain) is Behind this Fence on Luke Air Force Base Property.



Creamery Branch



Figure 6-8: An Existing Path Near the Creamery Branch, Showing the Potential for Creating a Seamless System for Bicyclists and Pedestrians.

The Creamery Branch provides several opportunities for non-motorized travel. First, as shown in Figure 6-2, the rail corridor is separated from the roadway, which provides a more comfortable user experience by separating non-motorized and motorized traffic. Figure 6-8 shows an existing path near the Creamery Branch demonstrating the importance of linking newly created paths/trails with established paths/trails to create a seamless system for bicyclists and pedestrians.

An analysis of the Creamery Branch also revealed issues related to user-friendliness, including unclear right-of-way, isolation, unsightliness and termination points. For example, Figure 6-9 shows that the right-of-way along the Creamery Branch is not clearly defined. Cars are free to drive over the potential path/trail, creating an uncomfortable and potentially unsafe situation for users.



Figure 6-9: Along the Creamery Branch, Right-of-Way is Not Clearly Defined.

Figure 6-10 shows a portion of the Creamery Branch that is unattractive and untidy, creating an unsightly appearance and isolating conditions for potential users.



Figure 6-10: This Portion of the Creamery Branch is Unattractive and Untidy.



Figure 6-11 shows how obstacles threaten to end the potential trail alignment. When creating travel opportunities in existing corridors, it will be important to clearly identify the non-motorized travel route to eliminate obstacles between origins and destinations.



Figure 6-11: An Obstacle Threatens to End the Potential Path/Trail in the Creamery Branch.



Figure 6-12: Some Residential Developments With Fences Do Not Provide Access to Potential Off-Street Paths/Trails.

Another issue near the Creamery Branch is one of access from private developments. As shown in Figure 6-12, some residential developments near potential path/trail corridors do not provide access. Access is a key issue in determining whether a path/trail will be used by potential users.

Roosevelt Water Conservation District Canal

Site visits to the Roosevelt Water Conservation District (RWCD) Canal revealed opportunities similar to the other representative project sites. A very important issue discovered was the lack of human scale and shade along the canal. Without amenities, it is unlikely that people will actually use a path/trail. Figure 6-13 shows this problem.



Figure 6-13: The Roosevelt Water Conservation Canal Has No Shade and a Lack of Human Scale.



Crossing canals can also be problematic. While canals do intersect roadways to provide access to destinations for path/trail users, access across the canal to access destinations at mid-points, such as neighborhoods, is not possible (see Figure 6-14).

Crossing 'v-ditches', or smaller drainage channels along canals, is also a challenge.

'V-ditches' are flood control features that parallel canals and flood control channels. They typically are about 2-feet deep and about 3-feet across. While these channels may not appear to be a major obstacle, they could be a significant deterrent to corridor accessibility (see Figure 6-15).

Another issue with canal corridors, and many other types of corridors, such as flood control channels and rights-of-ways and railway corridors, relates to safety. Ensuring compatibility between non-motorized travelers and existing uses, such as maintenance vehicles using existing O & M roads, may create safety concerns for both users and those public agencies who must maintain corridors for a purpose other than paths or trails. For example, Figure 6-16 shows a maintenance vehicle cleaning the RWCD Canal.



Figure 6-14: Crossing Canals to Access Mid-Point Destinations, Such as Neighborhoods, Can Be an Issue for Users of Canals.



Figure 6-15: Crossing 'V-Ditches' Can Be a Challenge for Path/Trail Users.



Figure 6-16: Existing Operations and Maintenance Activity in the Roosevelt Water Conservation District Canal.



Mid-Block Crossings

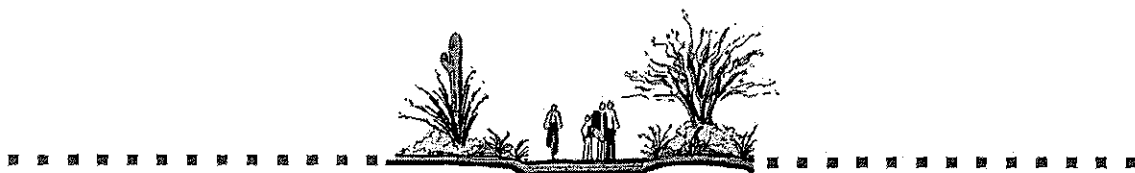
An issue present in all three of the representative projects is mid-block crossings. Through the MAG region, corridors identified in the ROSS Plan cross arterial streets in mid-block locations, away from a signalized intersection typically used primarily by motorists. While intersecting arterials provides critical access between origins and destinations for path/trail users, these types of crossings are not consistently marked or signed as crossings, or signalized in a uniform manner. As bicycling and walking grow in popularity and portions of the corridors identified in the ROSS Plan are developed into paths/trails, these types of crossings will be used more frequently.



Figure 6-17: Mid-Block Crossing in the Creamery Branch Representative Project.



Figure 6-18: Mid-Block Crossing in the Roosevelt Water Conservation District Canal Representative Project.



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SECTION VII: DESIGN GUIDELINES

INTRODUCTION

This section of the ROSS provides basic guidelines to assist MAG member agencies in developing the corridors identified in Section V. These guidelines have been developed based upon the analysis of the representative projects described in Section VI, and include standards from several sources, including:

- MAG member agencies;
- *MAG Pedestrian Area Policies and Design Guidelines;*
- *MAG Pedestrian Plan 2000;*
- American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Development of Bicycle Facilities;*
- *Trails for the 21st Century;* and
- *Universal Trail Assessment by Beneficial Design.*

This section begins with a general discussion of factors affecting path and trail usage and path/trail user needs. This information is important to consider when designing paths/trails since not all types of users will use all paths/trails. Design guidelines have been divided into two categories. The first category, general design guidelines, applies to all types of off-street corridors. General guidelines have been stratified into the general goal areas of access, safety, connectivity and user-friendly. The second category, specific design guidelines, has been developed to apply to the each of the specific corridor types, such as canal and utility line easements, identified in the ROSS Plan.

FACTORS AFFECTING PATH/TRAIL USAGE

In general, there are a range of issues which affect how and why paths/trails are used. According to the Federal Highway Administration (FHWA) *National Bicycling and Walking Study*, factors that affect an individual's travel mode can be classified into two basic



categories: subjective factors that relate to personal needs and objective physical factors which exist for all types of users. Subjective factors include distance traveled and travel time, concerns about traffic safety, convenience, personal values and habits, and whether the path/trail links to appropriate destinations. Objective factors include environmental and infrastructure related factors.

Distance traveled will vary among path/trail users, and may vary between individuals based upon their physical condition, attitude toward exercise, whether the perception of distance is accurate and the type of trip. Travel time, and how individuals value the time they spend traveling, affects how often and how much paths/trails are used. As the FHWA *National Bicycling and Walking Study* points out, travel time is not always correctly calculated by travelers. For example, non-motorized travel can be quicker in denser, more congested areas, and using cycling and walking for short trips can reduce the amount of free time dedicated to aerobic exercise.

Traffic safety can affect whether persons choose to walk or bicycle and whether they use paths/trails. Traffic safety includes existing traffic patterns on roadways intersecting or adjacent to paths/trails, and whether the crossing of busy roadways is comfortable and safe for users. Convenience includes comfort and reliability, and ease of access. Personal values and habits also shape use of paths/trails. As with other behaviors, research has shown that travel patterns are governed largely by habits. As auto ownership rates increase in the United States, it may become increasingly important to persuade persons to "break the habit" of single-occupant vehicle travel. Personal values, such as environmental concerns, may also increase the use of paths/trails for travel to daily destinations.

Objective factors influencing the use of paths/trails include environmental factors such as climate and topography. The favorable mild and dry climate available most of the year in the MAG region and the relatively flat terrain creates user comfort which can increase the use of paths/trails. The mere presence of adequate non-motorized transportation facilities, such as paths/trails, bike lanes and sidewalks can encourage bicycle and pedestrian travel. Numerous studies have confirmed that including appropriate non-motorized transportation travel ways determines whether people will walk or bike instead of driving. The presence of adequate facilities also increases the perception of safety for potential and existing users.

Finally, and perhaps most important, is the factor of access and linkage. In order to attain a true mode shift from driving to bicycling and walking, an interconnected non-motorized transportation system which links origins, such as residences and employers, to destinations, such as neighborhoods, parks, schools and grocery stores, is needed. Placing



origins and destinations, such as residential and commercial activities, far apart through zoning and residential design standards limits the potential for bicycle and pedestrian travel. Mixed-use areas can shorten the distances between neighborhoods and basic services, enhancing the feasibility of walking and bicycling. In addition, fragmented or discontinuous sidewalks, bike lanes or paths/trails create major obstacles to travelers.

THE NEEDS OF USERS

The needs of different users will vary. In implementing the ROSS Plan, identifying specific user groups of path/trail segments will be an important factor in determining key design features, such as path/trail width, surface type and appropriate amenities, such as lighting, landscaping, benches and trailhead facilities. The basic characteristics of path/trail uses are compiled in Figure 7-1.

Type of User	Preferred Surface	Average Travel Distance	Average Outing Time
Pedestrian (Hikers and Walkers)	Any	¼ to ½ mile	10 to 20 minutes
Bicyclists	Smooth	2.5 miles	30 minutes
In-Line Skaters	Smooth	2 miles	1 hour
Equestrians	Soft	5 miles	3 hours
Special Populations	Smooth	Varies	Varies

Source: Charles A. Flink, ASLA, President of Greenways Incorporated. From the Maricopa Association of Governments (MAG) Bicycling and Walking into the 21st Century Conference Series, Creating an Off-Street Path System in an Urban Environment, conducted on April 25-26, 2000 at the Tempe Mission Palms.

Figure 7-1: Types of Path/Trail Users.

Pedestrians

Pedestrians, such as hikers and walkers, are an important user group to consider in the planning process for paths/trails. As noted in the MAG *Pedestrian Area Policies and Design Guidelines*, pedestrians are an integral component of any transportation system. Any driver becomes a pedestrian upon leaving a motorized vehicle or bicycle. Public transportation



users are pedestrians when they walk to their transit station, and between transit stops and their final destination. In addition, walking is one of the most popular outdoor activities in the United States. The benefits of walking have been documented extensively in Section III of the ROSS and throughout transportation and health literature.

According to the *MAG Pedestrian Area Policies and Design Guidelines*, a basic principle of pedestrian travel is that people will choose to walk a 10-minute trip or $\frac{1}{4}$ mile to a destination, and even longer (up to 20 minutes or $\frac{1}{2}$ mile) if the route is comfortable and safe, or if the need is great. Most pedestrians are comfortable on a variety of surface types. As with all types of travelers, directness and ease of travel is very important – the lack of a direct travel route may limit mobility. Walkway capacity can be an important factor to consider in areas of high pedestrian use. A sufficient portion of the walkway should have an effective walkway width (portion of the walkway typically used by pedestrians for movement) of 2.5 to 3 feet per person to accommodate two-way travel. The *MAG Pedestrian Area Policies and Design Guidelines* provides additional principles, recommendations, policies and design guidelines to assist in making pedestrians safe and comfortable when traveling.

Bicyclists

According to the Arizona Department of Transportation (ADOT) *Planning Guide for Bicycle Facilities*, bicyclists vary widely in terms of skill level, experience with traffic, knowledge of laws and procedures, and physical fitness level. When designing a user-friendly system for non-motorized transportation, paths/trails should be designed for the least skilled bicyclist. Different types of bicyclists tend to prefer different types of facilities. Highly skilled and experienced bicyclists are best served by designing roadways to accommodate shared use by bicycles and motor vehicles. Less skilled bicyclists, children and persons with limited physical ability are generally uncomfortable sharing roadway space with fast moving motor vehicles. This group of bicyclists is best served by providing off-street paths/trails and by providing appropriate crossing of major roadways. Education may also be appropriate to help less skilled bicyclists improve their bicycling skills and confidence level in sharing roadway space with motor vehicles.

Equestrians

Equestrians require special accommodation in width of the travel way, vertical clearance and reach, trail surface, vegetation and signage. In general, equestrians tend to prefer native soils since non-native soils may include vegetation that is poisonous to horses. Equestrians require a wider travel way and higher vertical clearance. Equestrians require



trails with treads that are free from hard/smooth surfaces, severe slope, rocks, roots, holes, ruts, wire, and other obstacles that may cause a horse to lose its footing or trip and fall. Finally, signage that provides user guidelines indicating the preferred modes of travel along paths/trails is particularly helpful for equestrians.

Special Populations

Many people have conditions that may limit their ability to travel along paths/trails. In general, different users will have different levels of mobility depending upon physical fitness levels, age and ability. The term "special populations" refers to persons who are limited in their mobility, and includes older adults, children, and people with mobility, sensory or cognitive impairments.

According to the U.S. Department of Transportation¹, characteristics of older adults may include: vision problems; limited attention span or memory; reduced range of joint movement; reduced ability to detect, localize and differentiate sounds; inability to avoid dangerous situations; slower reflexes and reduced endurance. All of these factors can significantly affect how older persons use paths/trails.

Children typically have fewer capabilities than adults due to a lack of experience and physical immaturity. Children have one-third less peripheral vision than adults, less accuracy in judging speed and distance than adults, and may be incapable of reading and/or comprehending warning signs and traffic signals.

"Children benefit from facilities such as lower drinking fountains, lower sign placement, and doors that are easier to open because they lack the physical stature and strength of adults. In addition, because many children have not yet learned to read, symbol-based pedestrian signals might be easier for them to understand than signals that contain words." ¹

People with mobility impairments include wheelchair and scooter users, along with those on crutches and those with prosthetic limbs. Wheelchair and scooter users travel faster than the typical pedestrian, while those on crutches and with prosthetic limbs travel slower. Those with mobility impairments are negatively affected by steep cross slopes and grades, require a wider path of travel, have reach limits and have a different line of sight.

¹ *Designing Sidewalks and Trails for Access. Part I of II: Review of Existing Guidelines and Practices.* Published July, 1999.



Persons with sensory impairments may have difficulty with navigating new areas and need to assimilate information through non-visual sources, such as texture and sound. These persons may also have a diminished capacity to react quickly to approaching dangers, obstacles or changing conditions.¹

GENERAL DESIGN GUIDELINES

General Design Guidelines To Ensure Access

The following guidelines will encourage access to the path/trail, and access through and across the corridor. People need convenient access to a non-motorized transportation system to provide a viable alternative to driving. The more convenient the access, the more people will use alternatives to driving alone.

While certain corridor features, such as freeways, roadways, canals and ditches, are opportunities for off-street non-motorized travel, these features can also significantly harm the access to and continuity of an off-street transportation network. Other factors that threaten access are private property and gated communities. A path/trail that welcomes people and allows travel options beyond its own corridor will be well-used and create a pleasant user experience.

- Remove, or resolve, obstacles that limit access such as 'v' ditches and fences. Possible options to 'v' ditches include using a prefabricated bridge to cross the ditch, or piping and filling the ditch (see Figure 7-2).
- Whenever possible, utilize the entire corridor for non-motorized transportation by providing a path/trail along both sides of a corridor.

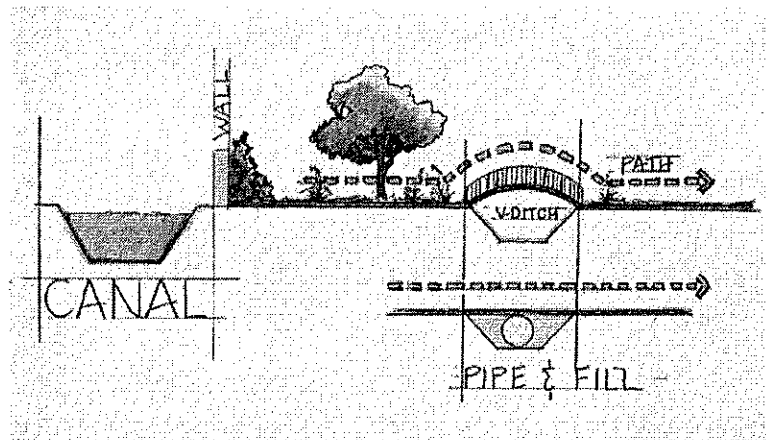


Figure 7-2: Potential Solutions to 'V' Ditches.

¹ *Designing Sidewalks and Trails for Access. Part I of II: Review of Existing Guidelines and Practices.* Published July, 1999.



- Obtain permission for access, or ownership, where a corridor crosses private property. If access is not possible, provide an alternative travel route (see Figure 7-3).
- Provide public access points no more than ½-mile apart. If distances are greater between access points, provide access to the path/trail as often as possible.
- Encourage local access to paths/trails for nearby residents through cul-de-sac entrances and backyard gates (see Figure 7-4).
- Provide regional access for short-term visitors that may not be local and include sufficient parking. Sufficient parking allows access to paths/trails for recreation and also allows longer trips to be partially made by bicycling or walking. Where feasible, parking should also accommodate equestrian users by having pull-through spaces for horse trailers.

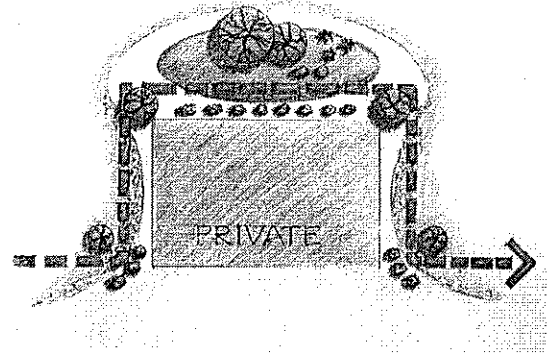


Figure 7-3: Whenever Possible, Negotiate Path/Trail Access Through Private Property. If Negotiation Fails, Create an Alternative Travel Route.



Figure 7-4: Neighborhood Path/Trail Access Through a Cul-de-Sac.



Figure 7-5: Construction of a Shared-Use Path Prior to Site Development.

- Prioritize access to the shared-use path/trail system before land is developed. Consider non-motorized travel needs in neighborhood planning and reserve connections to existing and potential corridors prior to development (see Figure 7-5).



General Design Guidelines to Ensure Safety

These safety guidelines address both a sense of personal security (also related to user-friendliness) and physical safety concerns from the natural and built environment. Safety is measured in terms of hazardous risks to the body or personal property. Injury can result from either purposeful or accidental events. Particular safety concerns in the potential corridors identified in the ROSS Plan include the possibility of falling electrical wires, drowning, tripping, collisions between cars and persons, and collisions between different user groups, such as bicyclists and equestrians. Some environmental safety issues to be addressed include flooding, lighting, fire and extreme heat. While not all risks can be eradicated, the guidelines provided below describe ways to minimize dangerous conditions for path/trail users.

- Establish regular patrols by police or volunteers along paths/trails in corridors and on roadways adjacent to paths/trails. Patrols could be made by bicycle, motor vehicle or horseback. Rural and isolated areas will need particular attention to increase personal security. Criminal incidents are less likely in well-traveled areas with a visible police presence.
- Incorporate the path/trail into the neighborhood watch system.
- Post signs regarding yield priority, user liability, risks, hazards and upcoming intersections. Provide striping and other surface markings to safely guide users along the path/trail within the corridor and to prevent conflicts between users. Use the *Manual of Uniform Traffic Control Devices* as a reference for signing and striping guidelines.
- Provide overhead lighting (see Figure 7-6). The layout of lamps should be

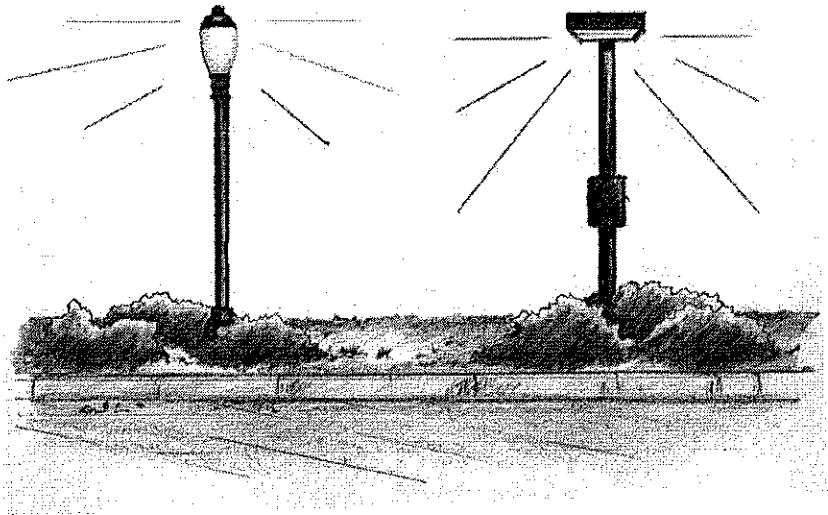


Figure 7-6: Overhead Lighting Helps Increase Safety of Path/Trail Users.



consistent, recognizable and unambiguous. Lamp placement should reinforce the direction of travel, reduce glare and minimize dense shadows. Vertical light distribution over paths/trails should cover or overlap at a height of 7-feet (see *Time-Saver Standards*, second edition, 1998, by Charles Harris and Nicholas Dines).

- Plants should not be placed in a manner that creates hiding places. A clear zone of three feet should be maintained when measured from a height of three to eight feet. Therefore, shrubs shall be no greater than 3-feet tall and trees shall be limbed up eight feet, or higher. (Taken from the April 2000, Council of Landscape Architectural Registration Boards, L.A.R.E. Reference Manual).

- Provide safe mid-block crossings by constructing an overpass, an underpass, a safe crossing with a refuge area, or a crosswalk and signal (see Figure 7-7). It may be necessary to direct path/trail users to an existing signalized street crossing. Refer to the MAG/City of Tempe *Alternative Solutions to Pedestrian Midblock Crossings at Canals* provided in Appendix C to help create safe and comfortable mid-block crossings.



Figure 7-7: A Mid-Block Crossing with Appropriate Signage. Mid-Block Crossing Should be Designed According to the Guidance Provided in Appendix C of the ROSS.

- Provide emergency call boxes at approximately 1,000-foot intervals and at all nodes and gathering places. In rural areas, consider the use of solar powered boxes. Where possible, work with local law enforcement agencies and neighborhood watch groups to plan responses to calls. Each phone should identify its address for easy user identification.
- Eradicate graffiti on a consistent basis.
- Enforce existing local ordinances regarding trash pick-up and disposal of pet waste.



General Design Guidelines to Ensure Connectivity



Figure 7-8: Bridges Across Washes, Such as This Bridge Across Cave Creek Wash, Helps Connect People to Destinations.

Connectivity is defined by how the path/trail connects, or is planned to connect, to other corridor types, existing path/trail systems, other forms of transportation, and people to their destinations (see Figure 7-8). Creating a seamless non-motorized transportation system that links origins and destinations is a vital path/trail function. Connecting corridors of different types helps provide continuous off-street routes and provides variety for different users. This general design guideline category provides direction on how each path/trail should relate to its surroundings.

- Connect paths/trails to local destinations such as shopping centers, offices and restaurants, and to regional destinations such as major parks, fairgrounds and employment centers.
- To address the problem of terminating corridors, create trailheads where the path/trail has no obvious connections (see Figure 7-9). Alternatively, end the path/trail at a logical destination such as a park, school, employment center or shopping center, or create a path/trail loop which provides access to origins and destinations.
- Provide directional information at all path/trail intersections, nodes and gathering places, and at all logical points of access to the path/trail system.
- Link corridor paths/trails to existing and proposed non-motorized transportation systems. Provide for future connections and continuations by land banking, zoning ordinance or other regulatory instrument.

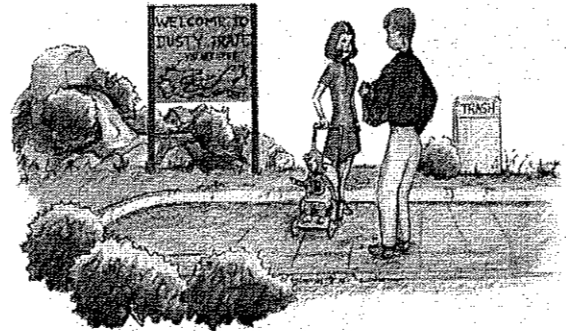


Figure 7-9: To Eliminate the Problem of Terminating Corridors, Change a Termination Point to a Beginning – A Trailhead or Node/Gathering Place.



- Provide people with multiple opportunities to enter and exit the path/trail. Regional path/trail access points should connect to arterial streets to provide access to on-street travel systems, such as transit, bicycle lanes and sidewalks. The ability for people to easily connect with the off-street non-motorized transportation system will increase the amount of users and their enjoyment of the trail.

General Design Guidelines to Ensure User-Friendliness

This general design guideline category describes design elements that can be used to help people feel comfortable and relaxed. Sociological behaviors can be affected by design of the natural and built environment. While people direct design through placement and construction of various amenities, design can also direct people. Personal comfort is affected by various factors such as air temperature, size relationships, convenience, visual space, noise levels, air quality, security and ability to rest. Increasing personal comfort by creating user-friendly paths/trails results in pleasant user experiences, encouraging future travel choices by bicycling and walking rather than driving.



Figure 7-10: A Rest Area with Appropriate Amenities for Path/Trail and Transit Users in Mesa. Appropriate Amenities Help Create a User-Friendly Non-Motorized Transportation System.

- Plant shade trees to cover at least 50 percent of the path/trail surface for increased user comfort and to provide a human scale to the landscape. If equestrian travel may occur, or where passage height is a concern, this guideline can be adjusted to fit specific situations.
- Place signs on shared-use paths/trails with specific yield instructions for users to encourage shared use and cooperation. To minimize user conflict, post information and signs regarding appropriate path/trail use at various places along paths/trails and at activity nodes.
- Meet the needs of an aging population and special user groups by incorporating path/trail standards for barrier free access as specified in the Americans with Disabilities Act (ADA guidelines) when possible.



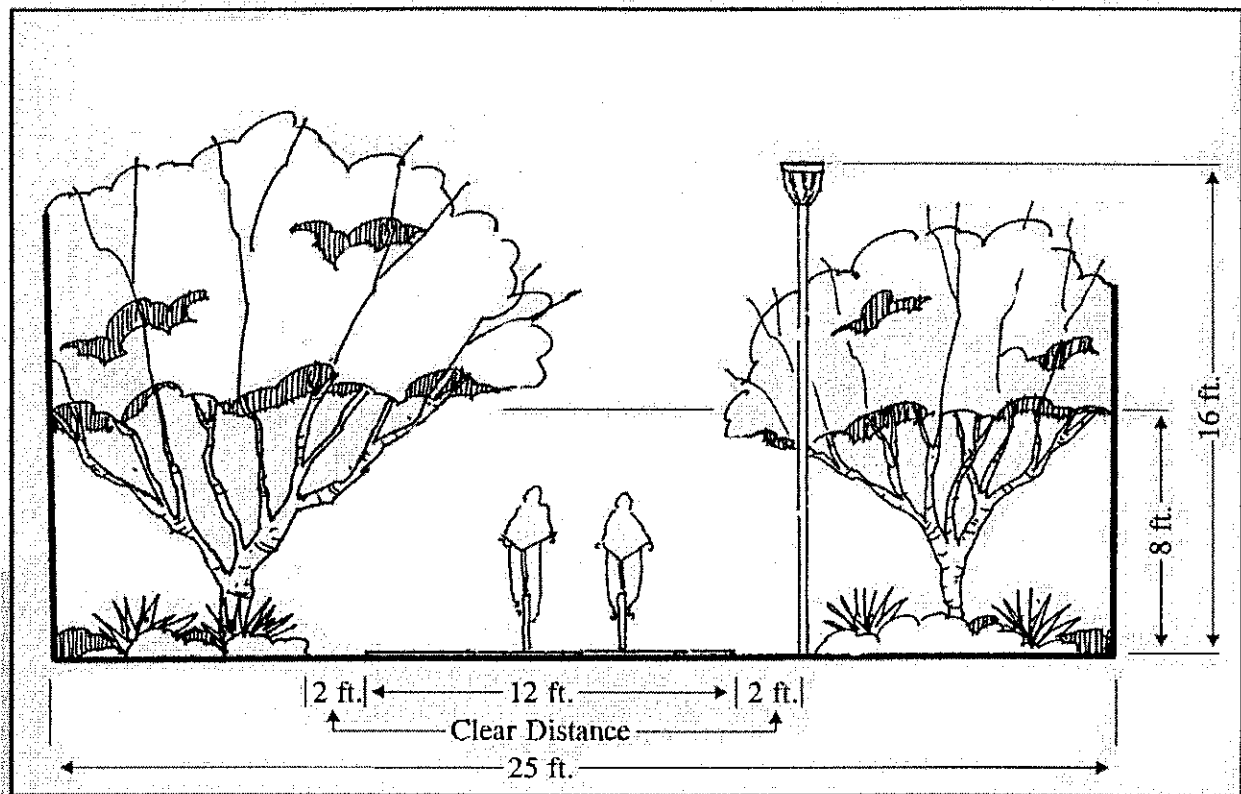


Figure 7-11: Recommended Path/Trail Section, Provided by the Tempe Multi-Use Path System Detailed Plan.

- While width will depend on the user mix, shared-use paths/trails should be an average of 10- to 12-foot wide where possible to allow for multiple users with minimal conflict (see Figure 7-11). This width allows two-way bicycle traffic, passing for pedestrians and bicycles, plus a clear distance. A minimum width for two-way traffic, or shared-use, is 8-foot wide with adequate signing and a reduction of speed. This width will accommodate even heavily used paths/trails (20-30 pedestrians per hour, plus the same amount of bicycles). Trail widths may be as little as 4-feet on corridors for short distances, with low anticipated use rates and open visibility, with adequate signing and no adjacent dangers. For additional information on path/trail width, refer to the sources mentioned in the Introduction of this Section.
- Surface treatment will depend on the user mix. All trail surfaces should be stable, smooth, slip-resistant and firm. The surface material should be free of irregularities and the surface edge should be uniform in width.



- When possible, select surface treatments that appeal to a wide range of users, including special populations and equestrians as well as bicyclists and pedestrians. Where corridor width allows, provide both a hard and soft-surface path/trail surface to increase user satisfaction and safety.

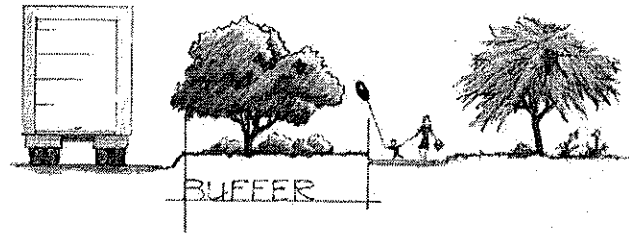


Figure 7-12: Add Separation Buffers Between Users and Unsafe Activities.

- Separate incompatible uses physically by building a fence, wall, curb or planting island between the path/trail and dangerous activity such as fast-moving water, active rail lines or vehicular traffic (see Figure 7-12). If possible, restrict operations and maintenance (O & M) vehicles to one side of corridor and leave the other side open to path/trail users (see Figure 7-13). Allow sufficient buffer/recovery space for the desired mix of users.

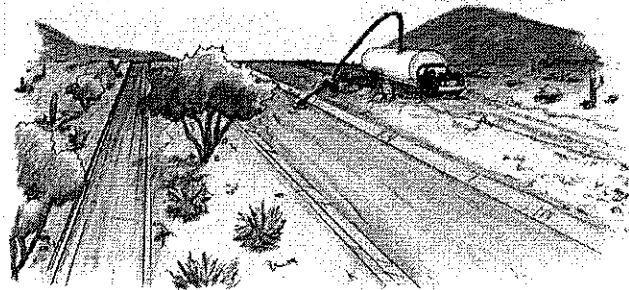


Figure 7-13: When Possible, Keep Operations and Maintenance Activities Separated From Bicyclists and Pedestrians.

- Avoid frequent or drastic changes in grade. However, occasional fluctuations in path/trail grade are desirable to provide variation for path/trail uses and to allow proper drainage.
- Clearly define the pathway through unique paving features or landscaping placement to create a human scaled environment (see Figure 7-14).

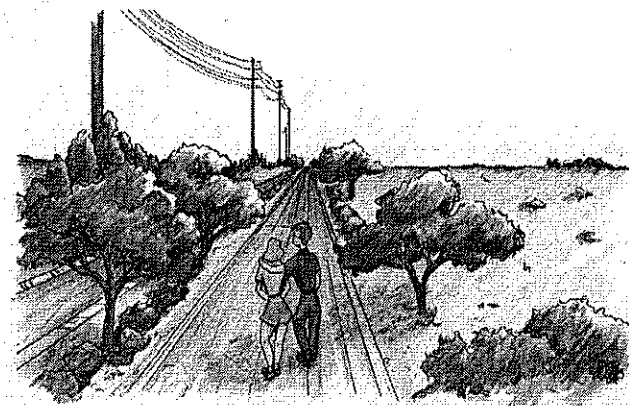


Figure 7-14: Clearly Defining the Pathway Creates a Human-Scaled Environment.



- Establish seating along paths/trails at approximately 500-foot intervals and at all nodes and gathering places.
- Accentuate regional views by removing vegetation and other debris that blocks views from the path/trail. Regional views in the MAG area include the adjacent mountains and skyline (see Figure 7-15). Some routes, especially utility easements and canals, may include scenic views of cityscapes.
- Screen unsightly views with plants or structures, such as drinking fountains or public art. Changing the orientation or direction of the path/trail may also be helpful in screening unsightly views.
- Post signs that orient people to their surroundings. Identify street names and provide directional information to nearby destinations such as schools and shopping. Mileage markers are also very useful.
- Provide bicycle parking at trailheads serving destinations such as shopping malls and retail shops, employment centers and schools. Bike lockers that secure the bike and protect it from the negative effects of weather should be provided at all park-and-ride and transit facilities.
- Increase user comfort and help maintain a cleaner path/trail environment with additional site amenities such as drinking fountains, restrooms and trash bins. These amenities should be created especially at nodes and gathering places.



Figure 7-15: Accentuate Regional View from Paths/Trails to Improve the Quality of the User's Travel Experience.



SPECIFIC DESIGN GUIDELINES

Canals

Access. Whenever possible, provide opportunities to cross the canal to reach destinations on both sides (see Figure 7-16). Bridges provide direct access to destinations for users, thereby reducing travel time and increasing convenience. The appropriate public agency, such as the Central Arizona Project or the Salt River Project (SRP) having authority over a canal needs to review all plans and documents related to canal improvements. It may be possible to use an existing structure to provide access (see Figure 7-17), rather than constructing a new bridge – which can be a more costly option.

Provide secured access for adjacent private developments and gated communities.

Work with property owners to use existing agricultural corridors (irrigation ditches, field roads) to create community access to paths/trails.

Safety. Provide temporary signage and safety cones during operations and maintenance activities.

Post signs describing potential risks and hazards of canals, and assign liability to the user.

Construct a barrier between the path/trail and dangerous operation facilities. This barrier may be a structure such as a wall or fence, or could be vegetative using small shrubs and cactus to deter people from entering the canal and its components.

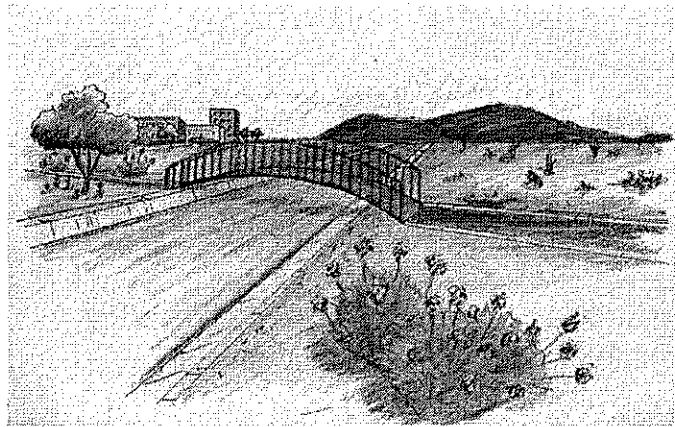


Figure 7-16: Provide Access to Both Sides of the Canals By Using Bridges.



Figure 7-17: It May Be Possible to Use an Existing Operations and Maintenance Structure to Provide Access Across Canals.



Provide opportunities for self-rescue, such as stairs along concrete banks (Figure 7-18). Post signs assigning liability to the path/trail user.

User- Friendly. Plant shade trees and shrubs 20 feet from the canal edge.

Physically separate people from maintenance traffic and operations activities. When possible, confine maintenance vehicles to one side of canal and people to the other.

Create open views to the right and left to decrease the obvious linear nature of the corridor. Maintaining clear lines of sight visually connects people to their regional and local surroundings and also acts as a way-finding feature. When creating open views, be sensitive to the privacy of adjacent property owners abutting the canal.



Figure 7-18: Self-Rescue Opportunity Provided by Stairway in a Canal.

Remove vegetation, prune trees, or elevate the path/trail to emphasize significant visual features such as the Red Mountain, the White Tanks, the Estrella Mountains, and the San Tan Mountains.

Flood Control Structures and Rights-of-Way

The Flood Control District of Maricopa County (FCDMC) has an aesthetics policy that must be integrated into all plans. FCDMC should be involved in the design and review process for all path/trail improvements to flood control structures and rights-of-way.

Access. Work with the FCDMC for access rights to corridors for paths/trails.

Wherever possible, provide paths/trails along both sides of flood control channels and allow equestrian use of the channel bottom. Connect sides through a series of paths/trails that descend into and rise out of the channel to allow crossings.



Safety. Provide flashing warning lights when flooding conditions exist.

Post signs describing flooding risks and assigning the liability to the user (Figure 7-19).

Construct a barrier between the path/trail and dangerous operations and maintenance facilities.

User-Friendly. Adhere to the FCDMC “kinder and gentler” approach of channel treatments. These treatments create channels with a softer appeal – green edges, seeded bottoms and more curves to decrease the linear quality of corridors. The FCDMC is currently writing guidelines for the multiple use of flood control structures and rights-of-way.

Plant shade trees and shrubs 20 feet from the channel edge.

Physically separate people from maintenance traffic and operations activities by constructing a wall, railing, or planting bed between the path/trail and dangerous activity. Cacti or other natural vegetation can be used to deter people from crossing into hazardous areas.

Create open views to the right and left to decrease the obvious linear nature of the corridor. Remove vegetation and debris, and prune trees to frame these views.

Seed the bottoms of dirt channels to minimize reflective heat.

Highway and Freeway Rights-of-Way

Access. Access to these routes should have more entry and exit points and parking areas to encourage longer distance travel along the path/trail. With more access points, more people will utilize the path/trail.



Figure 7-19: This Sign along the Indian Bend Wash in Scottsdale Warns of the Dangers of Illegal Swimming.



Provide safe and comfortable access across freeways and their associated on and off ramps. Safe crossings could include overpasses, underpasses, crossings with refuge areas and/or crosswalks with signals. It may be necessary to direct path/trail users to existing signalized crossings to ensure user safety.

Safety. Enforce trash pick-up to maintain a clean environment.

Plan for unobscured views into and out of the corridor. Encourage police and volunteer patrols. Allowing people to see the path/trail from adjacent roads provides more “eyes on the trail” and increases safety.

Post signs describing potential risks, and assign liability to the user.

Connectivity. Provide crossings for all freeway ramps and roads to create an unbroken and continuous path/trail (Figure 7-20).

Prevent enclosing the corridor with vertical elements. Plant trees on the wall side of the corridor to have the frontage road side open and accessible. Do not build walls on the frontage road side of the path/trail.

Provide freeway right-of-way path/trail connections to airports, park-and-ride lots, train stations, bus terminals and other transit facilities.



Figure 7-20: Creating Path/Trail Crossings Across Highways and Freeways is Essential to Maintain Connectivity for Path/Trail Users.

Provide grade separated crossings such as bridges and tunnels to maintain connectivity of non- motorized travel ways. Include grade separations early in the planning and design of highway and freeway development to avoid the high cost of retrofit.

Provide connections to other path/trail corridors if no current connections exist. These connections may require a short connection to an on-street facility, such as a bicycle lane



or sidewalk (Figure 7-21). Connections to the on-street transportation system also provide additional path/trail access points and direct connections for neighborhood residents to alternative transportation routes.

User-Friendly. Along highway and freeway right-of-way, the Arizona Department of Transportation (ADOT) must be consulted and should approve all design and construction plans.



Figure 7-21: Links Between the On-Street and Off-Street System
Provide Access and Connectivity to Origins and Destinations.

Encourage a “kinder and gentler” approach of drainage channel treatments. These treatments create channels with a softer appeal – green edges, seeded bottoms and more curves to decrease the linear quality of corridors. Use the guidelines currently being written by the FCDMC as a role model for this type of approach.

Plant shade trees and shrubs to buffer paths/trails from highways and freeways. Planting considerations will change depending on site specifics. Corridors without sound walls cannot have trees within 30 feet of the travel way, and the path/trail should be no closer than 50 feet to the highway or freeway.

A fence approximately six-feet high is needed to restrict non-motorized traffic from accessing the freeway.

Plant pollution tolerant vegetation.

To increase user comfort, mitigate noise and fumes. Sound walls can buffer excess noise and proper planting can filter and diffuse the air.

Railway Corridors

Access. Obtain permission to use private property for path/trail easements to maintain corridor access. When negotiation is not possible, seek ownership of the railway corridor where it crosses private property and a path/trail easement is needed.





Figure 7-22: This Secured Gate Provides Access for Residents to South Mountain Park.

Provide secured access to the path/trail for adjacent neighborhoods and private developments, such as strip commercial and military bases (see Figure 7-22).

Crossings of railway corridors necessary to maintain access should be limited to existing controlled-access intersections.

Safety. Provide plenty of access points to encourage use and provide more "eyes on the trail."

Post signs describing potential risks and hazards and assign liability to the user.

Connectivity. Connect cities and towns using rail lines to maintain cross-grid connections throughout the MAG region.

User-Friendly. Screen unsightly views of maintenance and industrial yards to increase user comfort and appeal of the travel way (see Figure 7-23).

When possible, add color and variation to buildings abutting the path/trail.

Whenever possible, keep tracks intact for historical and visual interest. The path/trail can remain level by increasing the level of the path/trail to the height of the tracks with asphalt, pavers or rubber mats.



Figure 7-23: Unsightly Views, Such as This Maintenance Yard, Should Be Screened to Create a Comfortable and Pleasing Travel Experience.

Utility Easements

Access. Provide access to paths/trails for adjacent private developments and residents in gated communities.



Safety. Provide catch systems to prevent broken lines from falling on the path/trail and potentially injuring a user.

Post signs describing the potential risks and hazards of high voltage power lines.

Assign liability to the user with posted signs.

User-Friendly. Plant trees to screen power poles and give a human scale to the corridor. All plans should follow the power company's published standards for proper tree types and be reviewed by the power company for approval (see Figure 7-24).



Figure 7-24: A User-Friendly Path.

Screen unsightly views with plants or decorative structures such as walls, or public art.

Provide privacy for adjacent residents. Most homes have walls, but those with only wrought iron fences may increase their privacy with landscaping. Vegetation can provide a physical barrier without compromising visual quality.

When possible, add color and variation to the buildings that line the path/trail.

Gas Line Corridors

Safety. Post signs identifying the utility type, its related dangers and assign liability to the user.

Connectivity. When right-of-way is limited, identify alternatives to continue the path/trail through or around private property, such as a nearby on-street bike lane or sidewalk (see Figure 7-25).

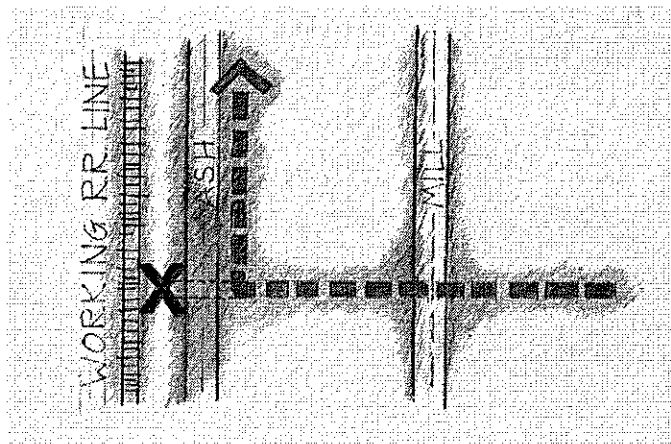


Figure 7-25: Altering the Direction of a Path/Trail May Help Maintain Connectivity.



User-Friendly. Plant trees and shrubs on either side of the utility line to provide shade without hindering access for operations and maintenance.

Use “soft” materials, such as decomposed granite, rather than concrete or asphalt, to preserve complete access to the gas line corridor for operations and maintenance activities.



Figure 7-26: Happy Trails!



SECTION VIII: IMPLEMENTATION

INTRODUCTION

This section of the ROSS Plan provides guidance to MAG member agencies implementing the off-street system. The overarching purpose of the MAG ROSS Plan is to define potential corridors for off-street travel and assist communities in implementing an off-street system of paths/trails for non-motorized travel. Since MAG has 24 member cities and towns, each community will have different community goals and values related to off-street non-motorized transportation. In addition, each community has different amounts of resources and opportunities to develop potential corridors as off-street travel ways. This section is a guide for implementing the system and identifies resources and processes helpful in developing a regional off-street non-motorized transportation system.

This section begins with a general process to develop an off-street non-motorized transportation system, including a model ordinance for adoption of the MAG ROSS Plan. Sample evaluation criteria are also included. Implementation issues, such as path/trail opposition, negotiating rights-of-way and easements, working with adjacent property owners, liability and maintenance, are identified and possible solutions are presented. This section concludes with recommendations identified as either a "MAG Action" or a "MAG Support" in a manner similar to the MAG *Pedestrian Plan 2000*.

GENERAL PROCESS TO DEVELOP AN OFF-STREET SYSTEM

Step One: Establish the Intent to Develop an Off-Street System

Figure 8-1 on the following page provides a summary of the process to develop an off-street system. To ensure that all interested parties in the community have the opportunity to participate in the planning process, the intent to develop an off-street system must be demonstrated to citizens and developers. Clarifying this intent provides two important benefits. First, city planners will have support when negotiating during the site review and subdivision design process. Land and physical developments of sites is best negotiated early in the development process to assure maintenance of property rights. Second, clarifying this intent also encourages additional citizen input to provide support for off-street paths/trails and help identify additional potential corridors for inclusion in the plan. Principles of participatory planning are provided in Appendix B, Path/Trail



Implementation Toolbox. Establishing the intent to develop an off-street system can be clarified either by adopting the model ordinance shown in Figure 8-2, or by amending existing transportation and open space elements of adopted general plans to include the potential corridors identified in the ROSS as paths/trails.

Step Two: Inventory Potential Corridors, Planned Paths/Trails and Community Facilities

The second step in implementing an off-street system is to inventory existing off-street and on-street facilities. Facilities that should be inventoried include sidewalks, shared-use paths, trails, bicycle lanes, bicycle routes, overpasses and underpasses for non-motorized travelers, and other types of facilities appropriate for non-motorized travelers. Identifying both on- and off-street facilities is important since one of the goals of the MAG ROSS Plan is to link the off-street system with the on-street system. The two systems can work together to provide the ability for multi-modal trips, increasing travel options and mobility for residents. In addition, since most destinations are located at intersections or along major roadways, access between the on-street and off-street system is essential to link origins and destinations. Linking origins and destinations is the essence of transportation. This inventory of existing and planned paths/trails should then be mapped along with major destinations, such as shopping centers, parks and other community facilities.

Step Three: Identify Potential Path/Trail Segments

The mapping done in Step Two above helps in the identification of potential path/trail segments. Once the existing and planned path/trail system is mapped along with community destinations, the map should be analyzed to identify gaps between origins and destinations. The potential corridors identified in the ROSS Plan can help fill some of the gaps in the non-motorized transportation system.

Site visits to verify the availability of potential corridors is important during this step. Some corridors may be terminated and not be useful for a path/trail. For example, although the right-of-way for a power line may be shown on a map, the easement may have already been incorporated into the backyards of homeowners who may have eliminated access to the potential path/trail. Unless negotiations with property owners are possible, this factor would be a "fatal flaw" that would prevent construction of a path/trail. Negotiating rights-of-way is an implementation issue discussed in more detail later in this section, and in Appendix B, Path/Trail Implementation Toolbox.



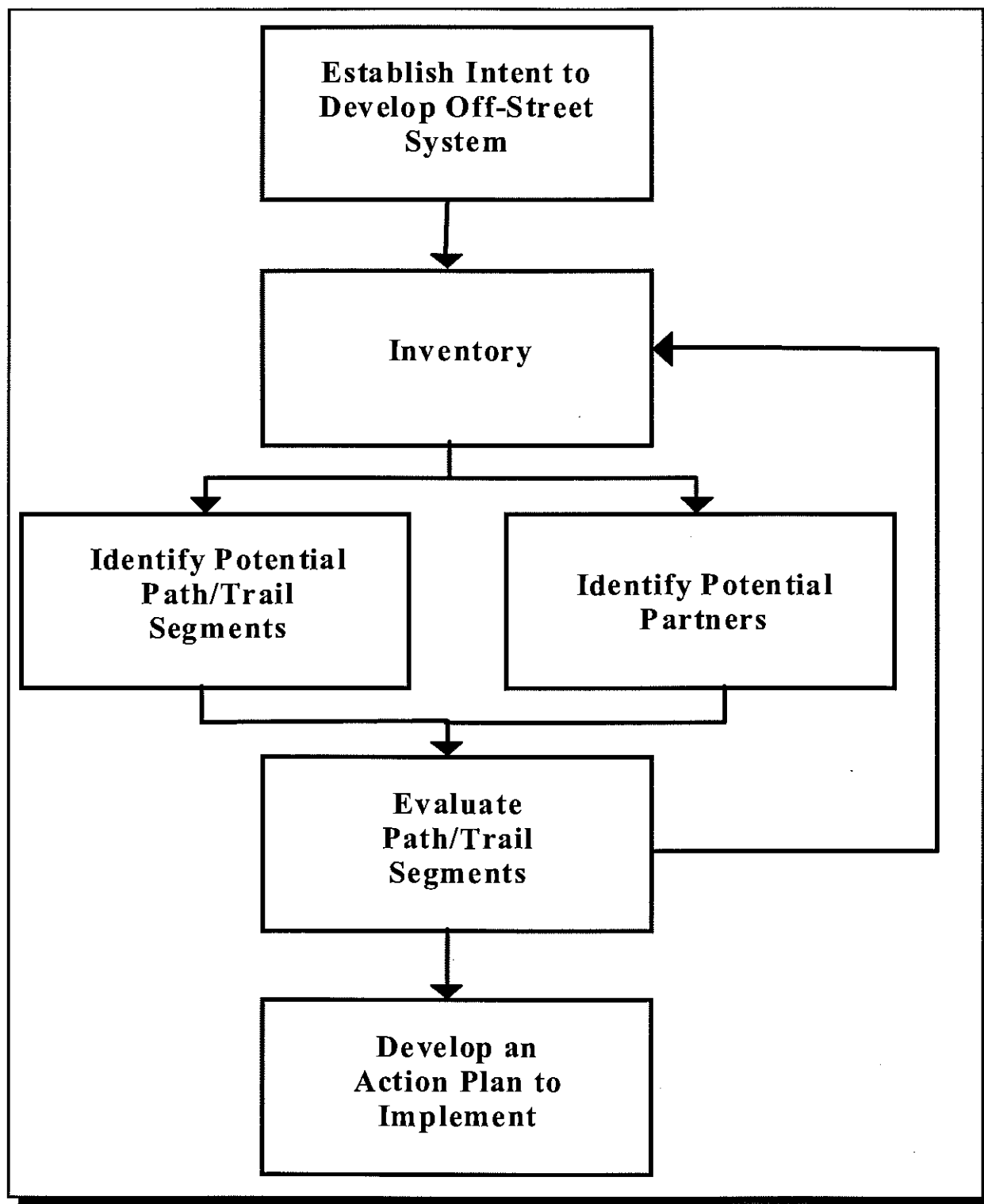


Figure 8-1: General Process to Develop an Off-Street Non-Motorized Transportation System.



CITY COUNCIL ORDINANCE ____ - ____

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF _____ ADOPTING THE SHARED-USE, NON-MOTORIZED TRANSPORTATION PATH/TRAIL SYSTEM WITHIN THE CITY, AS PREPARED BY THE MARICOPA ASSOCIATION OF GOVERNMENTS

WHEREAS, the City of _____ desires to improve regional shared-use, non-motorized path/trail transportation system in accordance with the City's General Plan policies, Section _____; and

WHEREAS, the City of _____ desires to plan a shared-use, non-motorized transportation system that provides a viable alternative to driving for local trips, such as trips to work, school, shopping and leisure activities; and

WHEREAS, the City of _____ desires a shared-use, non-motorized transportation system that provides sufficient, convenient access which is highly visible; and

WHEREAS, the City of _____ desires to develop a shared-use, non-motorized path/trail transportation system that is safe for a variety of users; and

WHEREAS, the City of _____ desires to make appropriate connections that will link origins and destinations using the existing on-street system and other modes of transportation; and

WHEREAS, the City of _____ desires to develop a shared-use, non-motorized path/trail system comprised of paths/trails and amenities that considers the needs of users and potential users; and

WHEREAS, the Community Services Commission, Finance Commission, Transportation Commission and Planning Commission have reviewed this ordinance and upon consideration of the recommendation of the City of _____ staff, have recommended adoption of this ordinance to the City Council;

NOW, THEREFORE, the City Council of the City of _____ DOES HEREBY FIND as follows:

1. That the proposed ordinance will implement the General Plan Goals and Objectives, and result in an improved regional shared-use, non-motorized transportation path/trail system.
2. That the proposed shared-use, non-motorized transportation path/trail system within the City, and recommended guidelines is attached as Exhibit A, and incorporated by this reference.

Figure 8-2: Model Ordinance for Adoption of the ROSS Plan.



3. That the proposed ordinance will implement an improved regional shared-use, non-motorized transportation path/trail system so as continuous connections between major destinations and with adjoining jurisdictions are made within the network.
4. That the proposed ordinance will comply with path/trail design guidelines as identified in the Maricopa Association of Governments Regional Off-Street System Plan to ensure a consistent and cohesive regional shared-use, non-motorized transportation path/trail system throughout the Maricopa Association of Governments region.
5. That pursuant to Section ____ of the City of ____ Arizona Environmental Quality Act procedures and Article ____ of the State Environmental Guidelines, it has been determined that the proposed project will not have a significant effect on the Environment. Thus a negative declaration has been prepared, processed and considered according to the Arizona Environmental Quality Act.

NOW, THEREFORE, the City Council of the City of _____ DOES HEREBY ADOPT the Shared-use, Non-motorized Transportation Path/Trail System Ordinance.

PASSED AND ADOPTED by the City Council of the City of ____ at the meeting held on the ____th day of ____, 20__.

MAYOR OF THE CITY OF _____

ATTEST:

CITY CLERK OF THE CITY OF _____

STATE OF ARIZONA)
COUNTY OF) SS
CITY OF)

I, _____, City Clerk of the City of _____, HEREBY DO CERTIFY that the foregoing Ordinance was duly adopted at the meeting of the City Council of the City of _____ on the ____th day of ____, 20__, by the following roll call vote:

AYES:
NOES:
ABSENT:

CITY CLERK OF THE CITY OF _____

Figure 8-2: Model Ordinance for Adoption of the ROSS Plan, continued.



Step Four: Identify Potential Partners

Since all of the corridors identified in the ROSS Plan have a primary purpose other than non-motorized transportation, one of the key ingredients of a successful project is cooperation. Many of the path/trail projects in existing corridors the MAG region were the result of extensive cooperation and coordination among numerous partners. One well-known example of regional cooperation is the Indian Bend Wash. This project was the result of cooperation among the City of Scottsdale, the Army Corps of Engineers, the Flood Control District of Maricopa County, and numerous volunteers and funding partners. Numerous other examples exist throughout the region. While not all projects will be of this scale or require the same level of participation, all projects will require cooperation and coordination. Identifying potential participants early in the planning and development process is important to adequately address concerns of all involved in the design of the path/trail project.

Step Five: Evaluate Potential Path/Trail Segments; Sample Evaluation Criteria

After potential path/trail projects are identified and partnerships begun, projects should be prioritized. While there are several ways to develop priorities, priorities should be based on community priorities and goals, with citizen involvement. One way to prioritize path/trail projects is to assess trip activity levels of users. The Technical Appendix of the *MAG Pedestrian Plan 2000* identifies three primary methods of assessing trip activity level for pedestrians, which also applies to all non-motorized travelers:

"There are three primary methods of assessing pedestrian trip activity. The first method is documenting *revealed demand*. This measure is accomplished by simply counting the existing number of people walking on the streets. A second method is to identify, map and *evaluate potential trip generators or attractors*. In practice, this method tends to focus on major pedestrian trip attractors. The third method is to assess the latent demand throughout the metro area. *Latent demand* considers both existing and pent-up pedestrian activity. It also enables planners and engineers to anticipate and plan for future pedestrian travel needs...The latent demand model is an effective analysis tool for assessing pedestrian travel demand. It:

- Includes all potential trip generators and attractors.
- Quantifies the potential trip interchange between generators and attractors.



- Recognizes the different trip types accounting for differing shares of the total trips
- Estimates the trip making probability of each trip type as a function of distance, and
- Can be employed to assess the latent pedestrian demand for any metropolitan roadway network."¹.

The latent demand model uses data typically available to street engineers, such as traffic counts, width of the roadway, and other factors. Since not every jurisdiction will use the latent demand model to prioritize projects, evaluation criteria were also developed as part of the ROSS Plan. The criteria presented below are intended to provide planning guidance and should be refined based on community goals and priorities.

Connects Origins and Destinations. The essence of transportation is to link people and places. Therefore, the main purpose of an off-street non-motorized system is to connect origins to destinations. If people are unable to travel to places they need to attend, the off-street system will not serve its intended function. This criteria must be present for any path/trail project. Projects which link future origins and destinations are also desirable.

Connects to the On-Street System. There are many areas where the on-street system can provide links to destinations and other modes of transportation, such as transit, in an appropriate and safe way. In order to further increase the potential for people to use and access the off-street system, it should be linked to the on-street system where possible. Connecting the off-street and on-street transportation systems is important because most destinations are located on arterial streets.

Fills a Gap. Throughout the MAG region, there are existing off-street and on-street routes with gaps. It is important to fill gaps both within and between jurisdictions to enhance connectivity and access. User frustration can result from discontinuous paths/trails because the path/trail will not allow persons to reach destinations. Bicyclists and pedestrians generally expect to continue to their destination along paths/trails, regardless of jurisdictional limits – just as roadway users. If people cannot reach destinations in a comfortable and direct manner, they will likely not use the off-street non-motorized system, and will find alternative means to travel – such as driving alone in a motor vehicle.

¹ MAG Pedestrian Plan 2000, Technical Appendix, December, 1999.



Sufficient Right-of-Way. The availability of sufficient right-of-way is a factor in when or if a path/trail is constructed. Depending on the right-of-way circumstances of the particular path/trail segment, this obstacle may be resolved through design guidelines identified in Section VII, or by working with property owners to either negotiate access or alter the travel direction of the path/trail.

Multi-User Appeal. Paths/trails should accommodate a wide range of user types, including bicyclists, pedestrians, equestrians and in-line skaters. While the primary groups targeted by this Plan are bicyclists and pedestrians, user access to paths/trails for a wide range of user groups should be maintained, and is desirable.

Multi-Modal Connections. An off-street non-motorized transportation system is an element of the overall transportation system necessary to maintain mobility for all residents in the MAG region. The off-street system should connect to other modes of transportation. Many persons use multiple modes for daily trips. Linking to other transportation modes, such as transit, allows bicyclists and pedestrians to extend the length of their trip without driving alone.

Does Not Require Significant Retrofitting. Path/trail projects with minimal retrofitting are more affordable and require less time to design and construct. In a multi-modal transportation system, integrating non-motorized transportation needs into motorized transportation facilities, such as highway and freeway bridge crossings, is essential to avoid costly retrofitting to accommodate bicyclists and pedestrians.

Improves Safety. Areas where safety is a concern for bicyclists and pedestrians in the existing system should be considered as priority areas for providing an off-street alternative. There are existing areas where pedestrians are not comfortable due to excessive traffic, poorly maintained sidewalks or no sidewalk.

In a Mixed-Use Area. Areas with commercial, residential and institutional uses combined present the best opportunities for encouraging the use of alternative transportation modes. Since distance is probably the greatest factor in people's decision regarding transportation modes, providing mixed land uses increases the likelihood of bicycling or walking rather than driving.

Potential for Cost Sharing. There may be opportunities to share the cost of construction with partners such as developers or jurisdictions, such as the Flood Control District of



Maricopa County or neighboring cities. Path/trail projects with funding secured through cost sharing are more likely to be constructed.

Cooperative Property Owners. Knowing that either the adjacent property owners, the agency controlling the right-of-way or both are supportive of the path/trail project allows a path/trail project to proceed.

Step Six: Create An Action Plan

The final step in developing an off-street system is to create an action plan. The action plan should identify specific projects and assign responsibility for implementation to individuals or groups. The action plan should answer the who, what, when, where and why questions of implementation. A path/trail cost estimate worksheet is provided in Appendix B, along with a path/trail development checklist. Both of these checklists are from Charles A. Flink, President of Greenways Incorporated. This information was presented at the MAG Bicycling and Walking into the 21st Century Conference Series, Creating an Off-Street Path System in an Urban Environment, conducted on April 25-26, 2000 at the Tempe Mission Palms.

IMPLEMENTATION ISSUES AND RECOMMENDED SOLUTIONS

Many issues exist related to implementing an off-street system. These issues have been identified through an analysis of representative projects (see Section VI) and through review of literature and the Regional Trails Forum meetings (see Section III). Issues explored in further detail below include path/trail opposition, negotiating rights-of-way and easements, working with adjacent property owners, liability and maintenance.

Issue: Path/Trail Opposition

Opposition to paths/trails can occur for a variety of reasons and from a variety of sources. For example, nearby residents may be concerned about increases in crime or declining property values. Owners of corridors may be concerned about liability or maintenance of the path/trail. Still other user groups may be concerned about potential conflicts between users, ssuch as between bicyclists and equestrians. The Rails-to-Trails Conservancy's *Secrets of Successful Rail-Trails: An Acquisition and Organizing Manual for Converting Rails into Trails* has identified answers to 12 frequently asked questions about path/trail opposition, which is replicated on the following pages in Figure 8-3. Additional resources for path/trail opposition are provided in Appendix B, Path/Trail Implementation Toolbox.



Do Trails Attract Crime and Vandalism to Neighborhoods? No. There is no evidence that trails cause an increase in crime. In fact, trail development may actually decrease the risk of crime in comparison to an abandoned or undeveloped corridor. And, several studies show that people prefer living along a rail/trail rather than an undeveloped corridor. Typically, lawful trail users serve as eyes and ears for the community.

How Can Trails Be Made as Safe as Possible? Trail advocates should be sure to address security concerns beginning in the planning stages and continuing through the development of a trail's management plan. The trail's design can also enhance safety, such as landscaping in a manner that limits deep shadows and hiding areas or installing emergency telephones in key areas along the trail. Various safety programs can be used once the trail opens, ranging from limiting use to daylight hours to establishing volunteer trail ranger programs and from holding periodic "safety days" to instituting regular police patrols.

What about Public and Private Liability? Generally trails are covered by the overall insurance policy of the public entity that manages the trail. Public liability risks from trails are small relative to other public services like roads, playgrounds and swimming pools. By taking safety concerns into account when designing and maintaining your trail, you can lower these risks. With respect to liability risks to trail neighbors, private landowners are protected by recreational-use statutes in all states except Alaska and the District of Columbia. Under these statutes, a landowner who does not charge a trail access fee will not be held liable for injuries sustained on his/her property unless an injured person can prove "willful and wanton misconduct on the part of the landowner."

What about the Privacy of Those Living near the Trail? According to a National Park Service study, most adjacent owners experience a minimal loss of privacy from the establishment of a trail. Generally, trails have a thick row of existing trees and shrubs along their edges. In addition, trail design specifications will call for additional vegetative screening to be added to the trail corridor to protect privacy. Fencing is expensive and rarely necessary, although some landowners do erect fences-often with a gate so they can access the trail.

How Does the Proposed Trail Affect Property Rights? In every case, a trail's managing body needs to own the corridor or have an easement in place. Trail managers need to know their contractual requirements and have clear policies regarding adjacent landowners' use and crossings.

Source: Rails-to-Trails Conservancy's *Secrets of Successful Rail-Trails: An Acquisition and Organizing Manual for Converting Rails into Trails*.

Figure 8-3: 12 Frequently Asked Questions About Path/Trails.



Do River Trail Corridor Crossings Create Traffic Hazards? No, not when properly designed. An advantage of river trails is that they tend to have fewer road crossings and driveways than on-street trails. Where crossings exist, well-placed warning and directional signs--both on the road and the trail--can prevent problems and help trail users and motorists avoid dangerous situations. In addition, trail advocates can work with the community to develop user education programs that teach trail etiquette and bicycle safety.

How Should User Conflicts Be Addressed? Creating the best trail possible requires tailoring trail design and permitted uses to the communities through which it passes. There may be circumstances or trail characteristics that make some uses impractical in certain areas. To prevent conflicts, a trail should be wide enough--generally 10 feet minimum, and at least 12 feet wide for urban and suburban trails, or where heavy use is expected. Naturally, trail rules should be posted at trailheads and near major road crossings, as well as in any trail related literature. Your trail could form a User Advisory Committee, made up of representatives from different users groups and trail neighbors, to discuss and solve problems.

Who Will Pick up the Litter? Trash has not presented much of a problem on most river corridor trails. Some trails have successfully adopted a "pack out what you pack in" position while others have regular maintenance schedules to empty well placed waste and recycling receptacles. Whatever method you choose, proper sign placement along the trail and in trail brochures will help ensure its success.

Where Will the Money Come from to Build a Trail? Many sources of federal, state, local and private funding are available for most trails. Although some opponents may say a trail is a waste of money, trails are remarkably inexpensive public facilities for the number of people they serve. The average trail costs \$50,000 to \$200,000 per mile to acquire and build, compared to \$1 million a mile for a suburban street and \$100 million a mile for some highways. In addition, the economic benefits often outweigh the costs. For example, an analysis of economic impacts of the Northern Central Trail in Maryland showed that in 1993, tax revenue on user purchases alone (\$303,750) surpassed operating costs (\$191,893).

Source: Rails-to-Trails Conservancy's *Secrets of Successful Rail-Trails: An Acquisition and Organizing Manual for Converting Rails into Trails*.

Figure 8-3: 12 Frequently Asked Questions About Path/Trails, continued.



What about Illegal Parking? As trails become more popular, parking can be a problem, so this topic needs advance consideration. Parking lots should be placed at trailheads. Also investigate the possible use of under-utilized parking areas of nearby institutions--such as churches during the week, or office buildings on weekends. Advocates should also encourage people to walk or bike to the trail instead of driving (which might encourage the development of on-road bike lanes). For persistent problems, enforcing strict parking regulations may be necessary until additional parking areas are available.

Will a Trail Cause Damage to Local Wildlife? Except possibly for a brief time during trail construction, most trails have a positive effect on wildlife. In fact, some trails have preserved a number of endangered and threatened species. Minnesota's Cannon Valley Trail, for example, shelters three endangered wildflower species and provides habitat for the threatened Wood Turtle. Generally, trails provide conservation areas and promote environmental education.

How Can I Defuse Potential Opposition? It is important to realize that most fear relating to trails stems from a lack of knowledge. The best way to turn potential opponents into advocates, or at least neutralize them, is to present accurate information as part of an overall, comprehensive public involvement strategy. It should address concerns and solve problems raised by adjacent landowners, future trail users and other interested parties even before the trail is open. In the end, a popular, well designed and well managed trail will convince virtually everyone that the trail is an excellent use of a river corridor.

Source: Rails-to-Trails Conservancy's *Secrets of Successful Rail-Trails: An Acquisition and Organizing Manual for Converting Rails into Trails*.

Figure 8-3: 12 Frequently Asked Questions About Path/Trails, continued.

Issue: Negotiating Rights-of-Way and Easements

A major implementation issue identified early in the planning process when developing the ROSS Plan relates to negotiating rights-of-way and easements for paths/trails. Many organizations with authority over the corridors and rights-of-way identified in the ROSS Plan lack formal guidelines for developing paths/trails within their corridors. In fact, some agencies are reluctant to allow any shared-use facility due to liability concerns. Most organizations with operational authority over the corridors identified in the ROSS Plan, such as utility companies, examine each path/trail development project on a case-by-case basis. Some agencies also lack accurate information of the location of their rights-of-way in a central location, which further complicates the implementation process. Figure 8-4 lists potential corridors identified in the ROSS Plan, along with contact information, major path/trail development issues and potential solutions.



Right-of-Way	Contact Information	Major Issues	Solutions
CANALS			
Salt River Project (SRP)	Senior Engineer System Design and Construction	Lacks uniform path/trail development standards	Negotiate on a case-by-case basis
Central Arizona Project (CAP)	Deputy Manager (623) 869-2333	Lack uniform path/trail development standards, liability concern hinders path/trail development	Negotiate on a case-by-case basis, await results of on-going study by Maricopa County Dept. of Transportation
Buckeye Irrigation Company	(623) 386-2046	Liability concern hinders path/ trail development	Negotiate on a case-by-case basis
Roosevelt Irrigation District	(623) 386-2046	Liability concern hinders path/trail development	Negotiate on a case-by-case basis
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCDMC)			
	Planning and Project Management Division of the FCDMC, Army Corps of Engineers contact may also be needed	Lack of uniform path/trail development standards, charter prevents construction and maintenance of paths/ trails, permitting issues with Corps of Engineers	Aesthetic guidelines exist and are being updated through a master drainage planning process

Figure 8-4: Potential Corridors, Contact Information, Issues and Solutions.

Right-of-Way	Contact Information	Major Issues	Solutions
POWER LINE EASEMENTS			
	SRP or Arizona Public Service	Some rights-of-way are discontinuous due to existing development	Reserve corridors by policy in a general plan
GAS LINE EASEMENTS			
	Southwest Gas, El Paso Gas and/or Black Mountain Gas	Path/Trail may not be possible due to small easement	Construct pedestrian path/trail rather than shared-use
RAILWAY CORRIDORS			
	Burlington Northern Santa Fe, Rails to Trails Conservancy (505) 767-6845	Liability concern prevents path/trails anywhere near working lines	Negotiate on a case-by-case basis where the railway may have excess right-of-way or an abandoned line

Figure 8-4: Potential Corridors, Contact Information, Issues and Solutions, continued.

Issue: Working with Adjacent Property Owners

An issue related to negotiating rights-of-way and easements is working with adjacent property owners. Property owner and tenant concerns have been identified by the American Greenways Program, and are summarized in Appendix B, Path/Trail Implementation Toolbox. This organization has also produced several fact sheets to assist in the construction of paths/trails. American Greenways suggests anticipating concerns of landowners so that answers can be given to common concerns. Key issues of concern include liability, crime, property taxes and property values, private property rights, maintenance and privacy.

Charles A. Flink, ASLA, President of Greenways Incorporated, provided several ideas on ways to work with adjacent property owners to address their concerns and negotiate



easements and access for paths/trails. These ideas were included in the course workbook for the MAG Bicycling and Walking into the 21st Century Conference Series, Creating an Off-Street Path System in an Urban Environment. The information below in Figure 8-5 is taken from the course workbook.

Meet with the landowner at a time and place of convenience and explain what your community/organization would like to achieve. Make sure that you define the difference between obtaining title to the land versus obtaining the right-of-public access across their property. Many government agencies have real estate officers or attorneys who are familiar with land acquisition for public purposes. Make sure that you seek their advice before meeting with the landowner, or have them attend the meeting with you.

After explaining the goals of your path/trail project, listen carefully to their response. Often the landowner will not be against the overall concept of the path/trail, they are simply unsure if they want the path/trail to cross their land. Many landowners have valid reasons for not wanting to participate in the path/trail concept – don't belittle or threaten the landowner for non-participation.

Offer all known incentives for participation in the path/trail program; be flexible, creative and reasonable. Do not offer to buy the land; purchase of real estate should always be the last resort, unless it is the stated purpose from the outset, in which case you simply need to have an appraisal of the property prepared and make a reasonable offer.

If your negotiation fails, you may want to consider employing a third party – someone who does not work within the municipality/organization, or in the employ of the landowner. It would be best to bring someone into the negotiations who is very familiar with paths/trails and their benefits, and can represent your interests in discussions with the landowner.

Provide the negotiator with necessary tools for continuing the discussions. Often times the landowner will realize that the land in question may not possess any real value; however, they will want to obtain a higher value for the exchange. The negotiator may be able to establish the value of the exchange.

If negotiations fail, serious consideration must be given to the importance of the property to the path/trail project. Can the goals of the path/trail still be achieved without the property?

Be patient. If at first you don't succeed, don't give up. Perhaps your community will have another opportunity to acquire the property or right of public access from a new owner of the property. Wait a few years and try again.

Figure 8-5: Working with Adjacent Landowners.



Issue: Liability

Liability has been a concern raised among many organizations who control the rights-of-way identified as part of the ROSS Plan. However, there is legislation that may ease this fear. The Arizona Revised Statutes (ARS) Section 33-1551 limits the liability of public or private landowners who make land and water areas available to the public for educational and recreational purposes. ARS Section 12-982 provides that a volunteer is not liable for acts or omissions that result in damage or injury if:

- 1) the volunteer acted in good faith and within the scope of the volunteer's official duties for a non-profit corporation or organization, hospital or government entity; and,
- 2) the damage or injury was not caused by willful or wanton misconduct on the part of the volunteer.

According to Charles A. Flink, ASLA, President of Greenways Incorporated, there are five main issues of concern in determining liability. These issues are provided in Figure 8-6 on the following page.



A key factor in deciding whether an agency or individual is liable for the injuries or damages suffered by another is the determination of negligence. Briefly, negligence is the failure to use reasonable care in one's actions. The determination of negligence depends on five main issues:

Defect: Did a potentially dangerous defect exist? In deciding this question, one must consider the standards and guidelines available at the time of construction. Revised guidelines produced later will not help much in this case; designers are not asked to design to non-existent standards.

Proximate Cause: The second question to ask is whether the defect was a proximate cause of the accident. The defect must be shown to be a substantial factor in the accident; it's not enough that a defect exists.

Contributory Negligence: The third question is whether there was any contributory negligence on the part of the user. If the bicyclist was riding carelessly – for example, racing another bicyclist – he or she may not recover damages at all. The amount of recovery he or she will get depends on the comparative degree of negligence on the part of the plaintiff and the defendant.

Knowledge: The third question is whether the agency had knowledge of the hazardous condition. This knowledge can be based on either actual notice or constructive notice. Actual notice would be in the form of a phone call or letter, for example. Constructive notice, on the other hand, is the idea that the agency should have known of the problem. This generally involves the passing of a certain amount of time.

Discretionary vs. Ministerial: Was the agency's action discretionary or ministerial? Discretionary actions involve higher level decision-making, like planning decisions, and tend to be immune from liability. An example would be the decision to locate a bicycle path in a particular linear park. Ministerial actions, on the other hand, involve relatively little discretion. Such acts as designing a path to a particular width, laying out a specific curve radius, or installing a barrier on a path would be considered ministerial. Further, if it can be shown that a discretionary act was taken without care, the agency could be liable for an abuse of its discretionary powers.

Source: MAG Bicycling and Walking into the 21st Century Conference Series, Creating an Off-Street Path System in an Urban Environment, conducted on April 25-26, 2000 at the Tempe Mission Palms.

Figure 8-6: Liability Issues



Issue: Maintenance

Maintenance is an important issue in decreasing liability and maintaining a comfortable and pleasant experience for users. The Denver Bicycle Master Plan includes a trail maintenance checklist which can be adapted based on local needs. The checklist was written by Jed Wagner of the Denver Parks and Recreation Department, who was the supervisor of Denver's Trail Maintenance Program for several years. This checklist was obtained from the American Trails Web site at www.americantrails.org, and is reproduced below in its entirety. Some portions of the checklist have limited applicability to the MAG region – especially snow and ice removal.

Maintenance to Be Performed on a Continuous, Scheduled Basis.

- **Trail User Safety.** Safety is central to all maintenance operations and is the single most important trail maintenance concern. Items for consideration include scheduling and documentation of inspections, the condition of railings, bridges, and trail surfaces, proper and adequate signage, removal of debris and coordination with other agencies associated with trail maintenance.
- **Trails Inspection.** Trails inspections are integral to all trail maintenance operations. Inspections will occur on a regularly scheduled basis, the frequency of which will depend on the amount of trail use, location, age and the type of construction. All trail inspections are to be documented.
- **Trail Sweeping.** Trail sweeping is one of the most important aspects of trail maintenance, helping ensure trail user safety. The type of sweeping to be performed depends on trail design and location. Trails that require sweeping of the whole system will be swept by machine. Trails that require only spot sweeping of bad areas will be swept by hand or with blowers. Some trails require a combination of methods. Sweeping will be performed on a regular schedule.
- **Trash Removal.** Trash removal from trail corridors is important from both a safety and an aesthetic viewpoint, and includes removing ground debris and emptying trash containers. Trash removal will take place on a regularly scheduled basis, the frequency of which will depend on trail use and location.
- **Tree and Shrub Pruning.** Tree and shrub pruning will be performed for the safety of trail users. Pruning will be performed to established specifications on a scheduled and as needed basis, the frequency of which will be fairly low.



- **Mowing of Vegetation.** Trails maintenance personnel will mow vegetation along trail corridors on a scheduled basis only where mowing is not performed by other agencies or park districts.
- **Scheduling Maintenance Tasks.** Inspections, maintenance and repair of trail-related concerns will be regularly scheduled. Inspection and repair priorities should be dictated by trail use, location and design. Scheduling maintenance tasks is a key item towards the goal of consistently clean and safe trails.

Maintenance to Be Performed on an Irregular or as Needed Basis.

- **Trail Repair.** Repair of asphalt or concrete trails will be closely tied to the inspection schedule. Prioritization of repairs is part of the process. The time between observation and repair of a trail will depend on whether the needed repair is deemed a hazard, to what degree the needed repair will affect the safety of the trail user, and whether the needed repair can be performed by the trails maintenance crew or if it is so extensive that it needs to be repaired by outside entities.
- **Trail Replacement.** The decision to replace a trail and the type of replacement depends on many factors. These factors include the age of the trail and the money available for replacement. Replacement involves either completely overlaying and asphalt trail with a new asphalt surface, or replacement of an asphalt trail with a concrete trail. In general, replacing asphalt trails with concrete is desirable. (A discussion of the different philosophies concerning the replacement of an asphalt trail with a concrete surface can be found elsewhere in the Bicycle Master Plan.) Parks Planning will coordinate all trail replacement, and the Trail Coordinator will recommend trails for replacement.
- **Snow and Ice Removal.** The trails maintenance crew, with the help of the various districts, will remove snow from all city trails as soon as possible after a snowfall. The trails crew will provide help as needed to any district. Ice control and removal of ice build-up on trails is a continual factor because of the freeze-thaw cycle. Ice control is most important on grade changes and curves. Ice can be removed or gravel/ice melt applied. After the ice is gone, leftover gravel should be swept as soon as possible.
- **Weed Control.** Weed control along trails will be limited to areas in which certain weeds create a hazard to users (such as "goathead" thorns along trail edges).



Environmentally safe weed removal methods should be used, especially along waterways.

- **Trail Edging.** Trail edging maintains trail width and improves drainage. Problem areas include trail edges where berms tend to build up and where uphill slopes erode onto the trails. Removal of this material will allow proper draining of the trail surface, allow the flowing action of the water to clean the trail, and limit standing water on trail surfaces. Proper drainage of trail surfaces will also limit ice build-up during winter months.
- **Trail Drainage Control.** In places where low spots on the trail catch water, trail surfaces should be raised or drains built to carry away water. Some trail drainage control can be achieved through the proper edging of trails. If trail drainage is corrected near steep slopes, the possibility of erosion must be considered.
- **Trail Signage.** Trail signs fall into two categories: safety and information. Trail users should be informed where they are, where they are going and how to use trails safely. Signs related to safety are most important and should be considered first. Information signage can enhance the trail user's experience. A citywide system of trail information signage should be a goal.
- **Revegetation.** Areas adjacent to trails that have been disturbed for any reason should be revegetated to minimize erosion.
- **Habitat Enhancement and Control.** Habitat enhancement is achieved by planting vegetation along trails, mainly trees and shrubs. This can improve the aesthetics of the trail, help prevent erosion and provide for wildlife habitat. Habitat control involves mitigation of damage caused by wildlife. An example is the protection of trees along waterways from damage caused by beavers.
- **Public Awareness.** Creating an understanding among trail users of the purpose of trails and their proper use is a goal of public awareness. Basic concepts of trail use include resolution of user conflicts and speed limitations. The representatives should be easily accessible to field questions and concerns.
- **Trail Program Budget Development.** A detailed budget should be created for the trails program and revised on an annual basis.



- **Volunteer Coordination.** The use of volunteers can help increase public awareness of trails and provide a good source of labor for the program. Sources of volunteers include Boy Scouts, school groups, church groups, trail users or court workers. Understanding volunteers' concerns is important, as are possible incentives or recognition of work performed. Implementation of an "Adopt-a-Trail" program should be considered.
- **Records.** Good record-keeping techniques are essential to an organized program. Accurate logs should be kept on items such as daily activities, hazards found and action taken, maintenance needed and performed, etc. Records can also include surveys of the types and frequency of use of certain trail sections. This information can be used to prioritize trail management needs.
- **Graffiti Control.** The key to graffiti control is prompt observation and removal. During scheduled trail inspections any graffiti should be noted and the graffiti removal crew promptly notified.
- **Mapping.** Several maps are privately marketed and available for trail users. From a maintenance standpoint, an accurate, detailed map of the trail system is important for internal park use.
- **Coordination with Other Agencies.** Maintenance of trails located within more than one jurisdiction, like the Platte River Trail and the High Line Canal Trail, is provided by other agencies, in addition to Denver Parks Department. A clear understanding of maintenance responsibilities needs to be established to avoid duplicating efforts or missing maintenance on sections of the trails.
- **Education and Interpretation.** Many segments of the trail system contain a wealth of opportunities for education and interpretation. A successful example is Denver Public Schools' Greenway Experience, operated for many years. Trails along waterways provide good opportunities to teach and study concepts about urban wildlife and ecology. Educational opportunities range from interpretive signage to educational tours.
- **Law Enforcement.** A greater law-enforcement effort might be made toward the goal of a safer trail system. Law enforcement agencies should be aware about the location of trails, and the types and levels of use they receive. Sections of trail corridors being used by transients is an ongoing problem that is not easily solved. Increased law enforcement awareness will be addressed on an as needed basis.



- **Proper Training of Employees.** Properly training maintenance employees is essential to the efficient operation of the trails maintenance program. All employees should be thoroughly trained to understand and be aware of all of the above-mentioned aspects of trail maintenance. Safety, a good work ethic, and proper care of equipment and tools will always be the backbone of a good training program. Employees must also be aware of the need for positive public contact. Proper positive attitude towards public questions and concerns is important, as is the conveyance of this information to trail supervisors.

RECOMMENDATIONS

The recommendations which follow address the wide range of issues and needs identified in the ROSS Plan. These recommendations have been created to help MAG and its member agencies meet the goals and objectives of the ROSS Plan. In a manner similar to that used in the MAG *Pedestrian Plan 2000*, each recommendation is identified as either a "MAG Action" or a "MAG Support." This classification helps to identify the "who" of the Goals and Objectives. A "MAG Action" is a specific course of action designed to achieve an objective implemented by MAG staff or the Regional Bicycle Task Force. A "MAG Support" is a specific course of action designed to achieve an objective that is implemented by MAG member agencies and which can be supported by MAG staff and/or the Regional Bicycle Task Force. The recommendations will help attain the vision statement of the ROSS plan: residents of the MAG region have safe, convenient access to an attractive, shared-use, non-motorized transportation system that provides a viable alternative to driving for local trips, such as trips to work, school, shopping and leisure activities.



MAG ROLE*	RECOMMENDATION
<p>*MAG ROLE: Action: A "MAG Action" is a specific course of action designed to achieve an objective implemented by MAG staff or the Regional Bicycle Task Force. This is the "who" of the Goals and Objectives. Support: A "MAG Support" is a specific course of action designed to achieve an objective that is implemented by MAG member agencies and which can be supported by MAG staff and/or the Regional Bicycle Task Force.</p>	
<p>ACCESS GOAL: Provide sufficient, convenient access to the non-motorized transportation system which is highly visible to existing and potential users.</p>	
Support	Encourage MAG members to plan for path/trail access by adopting the MAG ROSS Plan, and by expanding on the ROSS Plan by adding local paths/trails.
Support	Encourage land use patterns which place origin and destination points within reasonable walking and bicycling distance of one another by ensuring an appropriate diversity and mix of land uses in general plans.
Action	Develop a computerized presentation summarizing the key features of the MAG ROSS Plan to present to community groups and organizations interested in bicycle, pedestrian and open space issues.
Action	Develop information on the benefits of paths/trails specifically targeted for landowners and developers, and place this information on the MAG Web site.
Support	Encourage MAG members to plan for path/trail access by coordinating with developers and adjacent land owners during subdivision review processes.



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<p>SAFETY GOAL: Develop an off-street system of paths/trails that is safe for a variety of users.</p>	
Support	Encourage the implementation of the design guidelines included in the ROSS Plan to ensure the design of shared-use corridors which consider both the original purpose of the corridor and the safe mobility of non-motorized travelers.
Support	Support the expansion of path/trail etiquette resources to provide accurate, consistent and appropriate information to the diverse range of path/trail users.
Action	As appropriate, coordinate path/trail education materials and programs between MAG member agencies to provide consistent messages to non-motorized travelers.
Action	Identify path/trail needs for users not typically addressed in transportation plans, such as roller bladers and equestrians.
Action	Identify the potential feasibility of non-polluting motorized transportation, such as neighborhood electric vehicle (NEV) transportation, along off-street corridors.
Action	Develop Public Service Announcements on path/trail etiquette and the benefits of walking and bicycling.



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<p>CONNECTIVITY GOAL: Connect origins and destinations with paths/trails, and link paths/trails to the existing on-street transportation system and other transportation modes.</p>	
Action	Develop an annual budget for the publication and distribution of the ROSS Plan.
Support	Encourage jurisdictions to maintain connectivity between bicycle and pedestrian facilities, and other transportation modes and facilities such as transit and park-and-ride lots.
Support	Consider the needs of non-motorized travelers when evaluating subdivision plans.
Action	Create a comprehensive inventory of existing paths/trails to identify gaps in the non-motorized transportation system.



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<p>USER-FRIENDLY GOAL: Develop a system of paths/trails that considers the needs of users and potential users ("user-friendly").</p>	
Support	Encourage shared use and cooperation among path/trail users by implementing the design guidelines in the ROSS Plan.
Action	Ensure that all federally-funded non-motorized transportation facilities have amenities appropriate for the targeted user.
Action	Create a comprehensive map of transportation related paths/trails with additional information targeted specifically to user groups. This map may be done in conjunction with the Regional Bikeways Map, or may be a completely separate map.



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<p>IMPLEMENTATION GOAL: Achieve a truly regional system of off-street paths/trails by assisting MAG member agencies to develop portions of the off-street system under their jurisdiction.</p>	
Action	Widely distribute relevant portions of the ROSS Plan, and specifically target Planning and Zoning departments and Commissions of member agencies.
Support	Encourage MAG members to use the model ordinances outlined in the ROSS Plan to implement a regional interconnected non-motorized transportation system.
Support	Support the interpretation and revision of state legislation and policies to allow use of state transportation funds for pedestrian and bicycle facilities.
Support	Provide coordination between member jurisdictions on open space and multi-modal transportation planning, through formats similar to the Regional Trails Forum meetings, as a way to meet regional path/trail needs, such as continuity along jurisdictional boundaries and path/trail linkage to regional destinations.
Action	Continue funding for a MAG planner to provide support to path/trail users as a vital component of a region-wide multi-modal transportation system.
Support	Promote the formation of regional partnerships between MAG members and private sector agencies to implement the ROSS Plan.



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Action	Create an Advisory Membership category to the MAG Regional Bicycle Task Force to broaden representation to business groups, homebuilders, special interest groups and those with authority over the corridors identified in the ROSS Plan.
Action	Continue MAG staff and Regional Bicycle Task Force participation in the Long Range Transportation Plan update process and in the development of the Transportation Improvement Program.



APPENDIX A: CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN (CPTED) INFORMATION

INFORMATION SOURCE

The following information on Crime Prevention Through Environmental Design (CPTED) was found on the National Crime Prevention Council web site www.npc.org.

CPTED PRINCIPLES

CPTED examines various aspects of community planning including the following:

- the creation of space, its use and safety,
- the locations of land uses,
- the positions of buildings and other structures,
- interior and exterior design details such as color, lighting, entrances,
- and exits, and landscaping, and
- the users of space and when and how they will use it.

CPTED should be a key element in any local comprehensive crime prevention and control strategy. It encourages the community to be more intentional in the fight against crime. Decisions made by planners, designers and law enforcement officials can help or hinder a neighborhood for decades. These decisions influence resident and business conditions and behavior. They also influence two related phenomena – the probability that a crime will occur and the public's perception of community safety. The concept of crime prevention linked with environmental design provides a framework in which to assess opportunities for crime and to preclude these opportunities. CPTED uses many city agencies (such as planning, law enforcement, licensing and code enforcement, housing and



others) and members of the community in the solution and provides alternatives to traditional methods of dealing with crime. Moreover, it helps fix underlying problems instead of giving isolated solutions to individual incidents.

Unlike some other crime prevention and control strategies, CPTED emphasizes understanding and changing the physical environment of a building or neighborhood. Other strategies to prevent physical crime have emphasized fortification of property. Bars on windows and doors, alarm systems, cameras, gates and other techniques were employed to protect people and property and reduce re-victimization. These measures still have a legitimate, even vital, role. Beyond certain levels, however, hardening of potential crime targets can be expensive and disruptive. While alarms, cameras and guards can mask the symptoms, they may never resolve the problem if the building's location or its design provide criminals an opportunity.

Using CPTED makes efficient use of local resources. Successful CPTED programs bring together a wide range of community members – from residents and business professionals to government agencies. This multi-disciplinary approach includes collaborating to define problems, identify solutions, implement the most feasible plan and evaluate the results. CPTED is most effective when the collaborators participate in an ongoing dialogue that helps them to anticipate community needs rather than react to them. CPTED strategies enlist the most appropriate local agency or community group to help resolve the problem rather than assuming that law enforcement will take on the task.

Examples

In **Knoxville, Tennessee**, police, traffic engineers, public works officials and residents joined in CPTED and crime prevention training. They formed a task force to address drug trafficking and neighborhood nuisances such as excess vehicle traffic in residential areas. The group collaborated on a comprehensive strategy that resulted in street redesign, revised park schedules and volunteer-led, security-survey teams. Police officers learned how to work with design professionals to make projects more compatible with CPTED principles. This strategy reduced cut-through vehicle traffic by over 90 percent. The neighborhood also no longer has drive-through drug trafficking.

CPTED guidelines that began as a plan to reduce crime in one neighborhood in **Sarasota, Florida**, became an accepted part of the local planning process. The CPTED task force of planners, law enforcement officials and representatives of other agencies, organized by the city manager, recommended establishing by law a special zoning district. CPTED became part of a successful revitalization project for that district that was so successful that the city



council incorporated CPTED principles into all development and redevelopment in Sarasota.

A partnership of housing authority management, residents, and police officials in Cincinnati, Ohio, developed a CPTED plan which resulted in a 12 to 13 percent decline in crime in each of three successive years after the plan was implemented. It included community clean-ups, increased maintenance, new fencing, lease enforcement, and an array of on-site programs for parents and youth.

This material excerpted from the NCPD publication Designing Safer Communities: A Crime Prevention Through Environmental Design Handbook, available through our catalog.

BASICS OF CPTED

CPTED contends that architects, city planners, landscape and interior designers and law enforcement can create a climate of safety in a community right from the start by designing a physical environment that positively influences human behavior. CPTED builds on four key strategies: territoriality, natural surveillance, activity support and access control.

- **Territoriality:** People protect territory that they feel is their own and have a certain respect for the territory of others. Fences, pavement treatments, art, signs, good maintenance and landscaping are some physical ways to express ownership. Identifying intruders is much easier in a well-defined space.
- **Natural Surveillance:** Criminals don't want to be seen. Placing physical features, activities and people in ways that maximize the ability to see what's going on discourages crime. Barriers, such as bushes, sheds or shadows, make it difficult to observe activity. Landscaping and lighting can be planned to promote natural surveillance from inside a home or building and from the outside by neighbors or people passing by. Maximizing the natural surveillance capability of such "gatekeepers" as parking lot attendants and hotel desk clerks is also important.
- **Activity Support:** Encouraging legitimate activity in public spaces helps discourage crime. A basketball court in a public park or community center will provide recreation for youth, while making strangers more obvious and increasing active natural surveillance and the feeling of ownership. Any activity that gets people out and working together -- a clean-up day, a block party, a Neighborhood Watch group, a civic meeting -- helps prevent crime.



- **Access Control:** Properly located entrances, exits, fencing, landscaping and lighting can direct both foot and automobile traffic in ways that discourage crime. Access control can be as simple as a neighbor on the front porch or a front office. Other strategies include closing streets to through traffic or introducing neighborhood-based parking stickers.

These principles are blended in the planning or remodeling of public areas that range from parks and streets to office buildings and housing developments. Some jurisdictions have incorporated these principles into more comprehensive approaches.

THE THREE-D APPROACH TO PLANNING CPTED

One way to involve CPTED principles in community development of renovation projects is through a three-step review process.

- **Designation:** What is the intended use of the area? What behavior is allowed?
- **Definition:** What are the physical limits of the area? What are the borders between this area and public spaces? Is it clear which activities are allowed where? What risks can be anticipated and planned for?
- **Design:** Does the physical environment support the intended use safely and efficiently?

Using the "Three Ds" to assess a space may reveal a conflict between the "Ds" -- a conflict that should result in a modification. If a space has no designated purpose, is poorly defined, or is not properly designed to support and control the intended function, that space may generate crime and fear unless modifications are made. Thus, the challenge is to design a parking deck or position public restrooms that are not only functional, but also maximize the personal safety of legitimate users.

Once the three Ds have been considered, the space is assessed according to how well it supports territoriality, natural surveillance, and natural access control. Natural access control and surveillance promote a greater sense of territoriality among users and a greater perception of risk in potential offenders. This may be accomplished with real barriers, such as fences, or with symbolic barriers, such as low-growing landscaping materials, elevation changes, or even changing the texture of the sidewalk.



CPTED IS PART OF A COMPREHENSIVE CRIME PREVENTION PROGRAM

CPTED works best when integrated into a comprehensive crime prevention program. Some crime prevention practitioners have misunderstood CPTED, often because of improper training, and so they have developed target programs that focus on locks, lighting, and alarms, but miss critical CPTED design elements.

The proper application of CPTED can help turn a crime-threatened neighborhood around. Several approaches can discourage undesirable vehicular traffic, including instituting turn- or time-related restrictions, narrowing traffic lanes, or installing small barriers ("nubs") at intersections to make the street look smaller. Residents who are encouraged to get involved through Neighborhood Watch begin to establish or reassert territorial control, thus also increasing natural access control and surveillance. This can be done in several ways, including improved lighting, proper landscaping, and signs to identify the neighborhood.

BENEFITS OF CPTED

CPTED should be a key element in any local comprehensive crime prevention and control strategy. It encourages the community to be more intentional in the fight against crime and influences two related phenomena -- the probability that a crime will occur and the public's perception of community safety.

Other strategies to prevent physical crime have emphasized fortification of property: bars on windows and doors, alarm systems, cameras, and gates. These measures have a legitimate, even vital, role. However, hardening of potential crime targets can be expensive and disruptive. Alarms, cameras, and guards may never resolve the root of the problem if the building's location or its design provide criminals an opportunity.

CPTED makes efficient use of local resources, bringing together a wide range of community members -- residents, business professionals, and government agencies -- to define problems, identify solutions, carry out plans, and evaluate results. CPTED enlists the most appropriate local agency or community group to help resolve the problem rather than assuming that law enforcement will take on the task.

Municipal leadership will see:

- Less crime in neighborhoods and business areas,
- Increased collaboration among city agencies to improve public safety ,



- Improved perception of safety and livability in public areas and neighborhoods,
- More revenue from safer and busier business districts,
- Efficient application of local laws, ordinances, and procedures,
- Enhanced consideration of public safety in planning, development, and redevelopment projects, and
- Increased use of public parks and recreation facilities.

Local law enforcement will benefit from:

- Increased opportunities to develop crime prevention partnerships with residents,
- Enhanced crime prevention and problem solving skills,
- Sustainable links with planning, development, code enforcement, and other local agencies,
- Identification of potential crime problems in the community before they become serious,
- Clarification and action on neighborhood priorities related to crime and quality of life, and
- Assistance in gaining recognition that crime prevention is everyone's responsibility.

Residents in the community will find:

- Opportunities to play meaningful roles in community crime prevention,
- Improved sense of security and quality of life through reduced fear of crime,
- Fewer crimes committed in their neighborhood,
- Increased interaction among neighbors,
- New crime prevention and problem solving skills, and



- Better knowledge of city government agencies and resources.

CPTED at the neighborhood level usually results from a specific problem or issue at a specific site or facility -- an intersection, convenience store, school, park, or abandoned building. The CPTED program may be initiated by local government because agencies are aware of ongoing or potential crime problems, or it may result from residents' concerns about a neighborhood's future.

Communities should understand the connection between the various features of the neighborhood and the kinds of crime the neighborhood is experiencing. For example,

Crime may be related to existing land use:

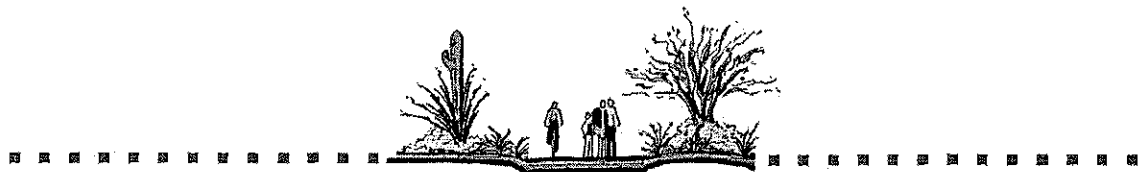
- Vacant buildings, lots, or commercial space,
- Crime may be related to traffic and transit during certain hours of the day,
- Streets that create a convenient path for cut-through traffic,
- Patrons who congregate at bus stops, and
- Parks that go unused at night.

Crime may be related to specific site or neighborhood characteristics:

- Tenants who are not invested in the community,
- Residents who don't know each other or don't report suspicious or criminal activity in the neighborhood, and
- Youth and elderly residents who sometimes have conflicting styles of behavior.

Crime may be related to ineffective rules or policies:

- Landlords who don't keep up rental properties,
- Large trash objects that accumulate in the neighborhood, and
- Deteriorating or vacant properties that attract criminal or suspicious activity.



Crime may be related to activity schedules and routines:

- Office buildings that are not occupied on weekends,
- Warehouses and factories that draw traffic and activity only during certain times of the day,
- Convenience stores that are open when surrounding businesses are not, and
- Traffic problems that are at their worst near schools during times when groups of students are in the area.

CPTED unites city agencies -- planning, law enforcement, licensing and code enforcement, housing and others -- and members of the community in solving problems of crime and the physical environment. Moreover, it helps fix underlying problems instead of giving isolated solutions to individual incidents.



APPENDIX B: PATH/TRAIL IMPLEMENTATION TOOLBOX

CONTENTS

- The Principles of Participatory Planning,
- Path/Trail Development Cost Estimate,
- Path/Trail Development Checklist,
- Top 10 Ways to Work with the Opposition,
- How to Effectively Deal with Private Landowners,
- A Compilation of Important Information and Data Related to the Development of Trails and Greenways,
- Costs and Benefits of Trails,
- Economic Benefits of Greenways: Summary of Findings,
- Crime And Vandalism,
- Property Owner and Tenant Concerns, and
- Are Trails a Benefit to Adjacent or Nearby Landowners?



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THE PRINCIPLES OF PARTICIPATORY PLANNING

Information Source

Charles A. Flink, ASLA, President of Greenways Incorporated. From the Maricopa Association of Governments (MAG) Bicycling and Walking into the 21st Century Conference Series, Creating an Off-Street Path System in an Urban Environment, conducted on April 25-26, 2000 at the Tempe Mission Palms.

Introduction

Most successful greenways have been created because local residents were asked to assist in the planning and decision-making process. In professional jargon, this is called "participatory planning," and it is uniquely American – the democratic process, freedom of speech, the right to choose – and an essential component of greenway development.

Participatory Planning Techniques

There are several techniques that can be used to get the public involved in the decision-making process. Among skilled public facilitators, these techniques can become quite elaborate and expensive to conduct. For greenway planning purposes, I have included some of the more simple techniques and provide the fundamental structure of each technique, which provides you with a choice for the appropriate application.

Listening. Listening is a one-to-one technique that places a facilitator (which could be you) with a participant (a committee member, citizen, or other individual). Listening occurs at the beginning of the planning process, after advisory committees are established, when landowners are first contacted, or as corporate donors are initially contacted. The premise of listening is that you prepare, in advance of the one-to-one meeting, relevant questions that you need answers for, and you ask the questions and allow the participant enough time to fully respond. There is a tremendous difference between *hearing* a response and *listening* to a response. Listening promotes understanding. Understanding another person's point of view can be the most difficult aspect of participatory planning.

Brainstorming. Brainstorming usually occurs within small group settings, up to 15 persons in total size, and involves intensive thought and consideration of specific topics. The primary purpose of brainstorming is to generate a wealth of ideas about a particular subject. Brainstorming does not take into consideration user needs; rather, its purpose is to explore the depth of specific topics and provide a framework for choice.



Homework Assignments. As adults, homework assignments provide us with additional time to thoroughly think through an issue, problem or recommendation, conduct required research, and provide a response that is more fully developed. Homework assignments are a good technique early in the planning process, where familiarity with complex topics is required, resource information is available, and time is needed to "level the playing field."

Role Playing. Role playing offers an exciting and challenging technique that can yield mind opening results for participants as well as the viewing audience. Often times, role playing will be used when it is desired to have opponents trade sides in order to better understand and appreciate the difficulty that is present in resolving a situation. With role playing, participants become actors, and are virtually assured that they can state opinions and implement actions that they would not have otherwise concluded. A skilled facilitator is required in order to execute the process and make sure that results are orchestrated.

Gaming. Gaming offers participants with the ability to express preferences by making choices. Usually gaming, for greenway planning, involves simulating what might happen under a defined set of circumstances. Presupposing that certain development strategies were carried out to the fullest extent, the game is played out to ascertain the end result. A skilled facilitator is required, first to establish the game, and then to assure that the game is being played according to established rules so that appropriate results are obtained.

Surveys. Surveys are tried and true techniques of participation that offer small, medium and large groups with direct input into specific aspects of greenway planning. The two most prevalent types of surveys that are conducted can be broadly defined as scientific and opinion or preference. Scientific surveys are based on proven techniques for involvement and provide a representative public response with minor error. Opinion surveys are accomplished under less rigid standards and vary greatly in format and interpreted results. Opinion surveys provide simple interpretation of public views, and are often used to guide general principles of planning and development.

Charette. A charette is conducted through an intensive two, three or four-day work session in which individuals, usually qualified professionals, quickly assemble and assimilate essential data, conduct a brief overview of site conditions, use brainstorming techniques to define development scenarios and develop a plan of action for future greenway development. Charettes are effective when limited time and other resources are present, and a quick but professional resolution to a problem is needed.



TRAIL DEVELOPMENT COST ESTIMATE

Information Source

Charles A. Flink, ASLA, President of Greenways Incorporated. From the Maricopa Association of Governments (MAG) Bicycling and Walking into the 21st Century Conference Series, Creating an Off-Street Path System in an Urban Environment, conducted on April 25-26, 2000 at the Tempe Mission Palms.

Background and Instructions

The following cost estimate form should be filled in using the most up-to-date and accurate cost data available. Upon completing this form, evaluate the total costs against the available budget and determine if the project can be developed in one or several phases.

Name of Project	
-----------------	--

PHASE I: TRAIL PLANNING		
	Administrative Costs	\$
	Publicity Materials (brochures, newsletters, advertising)	\$
	Information, Data and Materials (documents, maps, aerial photos, etc.)	\$
	Planning Consultant Fees	\$
	Public Meeting Costs (rental fees, duplication costs, food)	\$
	Utility Investigative Fees (electric, gas, fiber optic, cable television, other)	\$
Total Costs for Planning Phase		\$
PHASE II: PATH/TRAIL DESIGN		
	Land Surveyor Fees	\$
	Testing Fees (soils, groundwater, vegetation, etc.)	\$
	Design Consultant Fees (landscape architect, engineer, other)	\$
Total Costs of Design Phase		\$



PHASE III: PATH/TRAIL CONSTRUCTION		
A. ADMINISTRATIVE		
	Permit Fees (USACE 404, Water Management District, other)	\$
	Testing Fees (concrete, other)	\$
	Construction Management Fees (Landscape architect, engineer, other)	\$
B. SITE PREPARATION		
	Tools/equipment	\$
	Staking path/trail layout	\$
	Clearing and grubbing vegetation	\$
	Stripping/stockpiling topsoil	\$
	Excavation and rough grading	\$
C. DRAINAGE STRUCTURES		
	Waterbars	\$
	French Drains	\$
	Culverts	\$
	Diversions	\$
D. EROSION CONTROL STRUCTURES		
	Silt fence	\$
	Sediment basin	\$
	Retaining walls	\$
E. BRIDGES AND BOARDWALKS		
	Prefabricated Bridges: Number required: _____	\$
	Wooden Bridges: Number required: _____	\$
	Retrofitting existing bridges (railroad, highway, roadway)	\$
	Observation decks	\$
F. PATH/TRAIL TREAD DEVELOPMENT		
	Subgrade Preparation (subbase, geotextile fabric, other)	\$
	Woodchip surface	\$



	Gravel, Limestone, shale surface	\$
	Concrete Surface	\$
	Soil cement surface	\$
	Asphalt surface	\$
G. PATH/TRAIL HEAD DEVELOPMENT		
	Entry/access road	\$
	Parking lot	\$
	Connector path/trail	\$
	Landscaping	\$
H. LANDSCAPE RESTORATION		
	Topsoil	\$
	Permanent seeding/sodding	\$
	Fertilizer	\$
	Landscape Plants (trees, shrubs, groundcover)	\$
I. SITE FURNISHINGS		
	Trail Signage	\$
	Safety and Security Structures (bollards, gates, sities, other)	\$
	Fencing	\$
	Path/Trail Benches	\$
	Picnic Tables	\$
	Trash Receptacles	\$
	Bike racks	\$
	Restrooms	\$
	Drinking Fountains	\$
	Path/Trail Lighting	\$
	Cellular Phones	\$
	Other	\$
Total Costs for Construction Phase		\$



PHASE IV: MAINTENANCE AND MANAGEMENT		
	Drainage and storm channel maintenance	\$
	Sweeping/blowing debris off path/trail head	\$
	Pick-up and removal of trash	\$
	Weed control and vegetation management	\$
	Mowing of 3 foot grass safe zone	\$
	Minor repairs	\$
	Park Ranger Patrol	\$
	Maintenance supplies	\$
	Equipment fuel and repairs	\$
	Total Maintenance and Management Phase	\$



TRAIL DEVELOPMENT CHECKLIST

Information Source

Charles A. Flink, ASLA, President of Greenways Incorporated. From the Maricopa Association of Governments (MAG) Bicycling and Walking into the 21st Century Conference Series, Creating an Off-Street Path System in an Urban Environment, conducted on April 25-26, 2000 at the Tempe Mission Palms.

Name of Project	
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Done?		
	ADMINISTRATIVE	
	Person Who Is Overseeing the Project:	
	Designer/ Landscape Architect/ Engineer	
	Project Manager/ Budget Control Officer	
	Public Information/ Promotional Contact	
	PLANNING TASKS	
	Tools Needed to Complete Work:	
	Mapping (USGS Topo, aerials, 1" to 200' optimal scale.	
	Land Use information surrounding path/trail corridor defined.	
	Land Ownership identified, property owners notified.	
	Transportation plans for surrounding area (including widening and surfacing).	
	Previous work on corridor.	
	Location and approximate depth of utilities.	
	Soils, geologic data identified by:	
	Environmental Assessments by:	
	Work Items:	
	Define path/ trail corridor on appropriate scale maps, define points of travel origin and destination, linkage to other paths/trails, all access points including: multi-modal (auto corridor to path/trail corridor, parking and unloading); neighborhood/local; and interconnected (path/trail system to path/trail system).	



Done?	
	Identify all potential user groups (may include commuters, cyclists, walkers, joggers, equestrians, persons with disabilities or others).
	Define path/trail theme (may include transportation, recreation, educational resource, interpretive, special use, or a combination of these).
	Determine desired path/trail design parameters based on state or national standards: path/trail layout configuration, tread width, surface type, travel speed, line of sight, other facilities such as bridges, design weight limits/capacity.
	Define need for path/trail furnishings/accessories: rest areas, benches, picnic areas, interpretive elements, information/safety signage, toilets, drinking fountains, trash receptacles, lighting, etc.
	Define physical condition of landscape (forested, semi-wooded, open, desert) topography, intersections, conflicts with urban elements, opportunities for path/trail development, construction access.
	Determine location of utilities within corridor: overhead or underground electricity, gas, water, sewer, fiber optic, cable television, other.
	Define location of unique environmental conditions: unstable or erosive soils, sensitive animal habitat, presence of wetlands, cultural features, vegetation, hazardous materials, flooding, wildfire/forest fire hazards, cross drainage patterns, other significant natural features.
	Describe aesthetic condition of landscape: viewsheds, areas of light and dark, open and closed landscapes, climate effects (sun and wind exposure), odor and noise, potential user comfort.
	Determine permits required for development: federal, state or local environmental, Section 404 Clean Water Act, state and federal highway encroachments, roadway or railroad crossings/underpasses/overpasses, utility crossings, FEMA, clearing and grading, sediment and erosion control, other.
	Define safety and security issues: attractive nuisances, wildlife, insects, steep grades, drop-offs, use conflicts, blind spots, crime, security problems, access for rescue or maintenance crews, vegetation management.
	Identify development/management entity: _____
	Define funding issues relevant to design development: project costs, phasing and priorities, feasibility.
	Determine appropriate level of citizen participation in planning and design of the path/trail: create a citizens advisory committee to champion the plan.
	Hold formal public information meetings to describe planning, design and development process for the path/trail.



Done?	
	PRELIMINARY DESIGN TASKS
	Complete field survey of all property boundaries, identify ownership through location of iron pins or other property markers, define cross access easements, utility easement or other property encumbrances. Plot all information on maps.
	Complete soils testing to determine bearing capacity of soils for multi-use hard surfaced paths and structures such as bridges. Define location of unsuitable soils.
	Prepare a path/trail layout on a base map and complete a field layout of the proposed path/trail route on-site using surveyors flagging tape and stakes to illustrate location.
	Complete design details for path/trail cross section: define sub-grade according to bearing strength, stability, firmness, behavior when wet, frost line, presence of foreign material (such as railroad ballast); determine appropriate use of geotextile fabrics and soil sterility; define required thickness of subbase material with assistance from engineer; determine appropriate compaction rate; define the type and thickness of path/trail surface appropriate to serve identified user groups.
	Complete design details for bridges, including footings, deck surface, railing height and opening between rails; retaining walls; decking, boardwalks or wildlife observation platforms.
	Complete layout plans and design details for signage: reference the Manual on Uniform Traffic Control Devices for bikeways, Americans with Disabilities Act, and local sign ordinances to ensure compliance with appropriate regulations.
	Define site furnishings appropriate for project development, including: location and type of trash receptacles, bench seating, lighting, telephones, restrooms, drinking fountains, mileage markers, information kiosks, etc.
	Determine the location and type of security measures for the trail, including fencing, gates, bollards, emergency telephones, street signs, etc.
	Prepare a landscape plan for the project that restores and revegetates areas disturbed or to be disturbed by path/trail development. Specify plant material type, size and height; soil preparation; watering or irrigation requirements; fertilizing schedule, etc.
	Complete environmental permits for project and file with appropriate local, state and federal agencies.
	Obtain local and state review of Preliminary Design Work to ensure compliance with comprehensive land use, recreation, transportation, historic preservation, and water management plans.
	Submit preliminary path/trail drawings to utility companies, local transportation departments and other state and federal agencies for review and comment.



Done?	
	Prepare a sedimentation and erosion control plan for the entire project, submit to appropriate review agency for approval of grading permit.
	Prepare preliminary design development cost estimates for the project.
	CONSTRUCTION DRAWINGS AND BID DOCUMENTS
	Work Items:
	Prepare plan sheets that illustrate the location of the path/trail, and all path/trail facilities within the property boundaries defined. Use engineering plan and profile sheets to illustrate the horizontal and vertical position of the trail in the natural landscape. Prepare Cover sheet with index to drawings and general notes; grading plan; landscape plan; erosion control plan; and other plan sheets as project requires.
	Prepare necessary detail sheets to illustrate important features of trail facilities at a scale suitable for describing the intricate relationships, material preferences, methods of construction or installation, and other relevant specifications.
	Prepare Technical Specifications that describe the methods, materials and procedures for constructing, fabricating and installing all path/trail facilities. Typical component specifications would include: vegetation clearing and grubbing, excavation, site preparation, backfill, drainage, geotextile fabric, subbase, surfacing, erosion control, landscaping, concrete work, finish carpentry, landscaping and structural work.
	Prepare General Conditions of the construction contract.
	Prepare Bid Documents for contract construction: Invitation to Bidders, Bid Proposal Form, Bid Bond, Notice of Award, Performance Bond, Labor and Materials Bond, Notice to Proceed, Notice of Final Acceptance, Final Receipt.
	Develop final cost estimates for project development.
	Submit final construction documents to local and state agencies for review and approval.
	Prepare final survey plats and legal descriptions for trail easements.



TOP 10 WAYS TO WORK WITH THE OPPOSITION

Information Source

The following information was excerpted from Rails-to-Trails Conservancy's *Secrets of Successful Rail-Trails: An Acquisition and Organizing Manual for Converting Rails into Trails*.

Introduction

You can take various approaches when working with people who may oppose your trail project. In general, you should always stress the benefits of trails and keep adjacent landowners involved in the process. Here are 10 techniques you may find helpful.

Reach out to Adjacent Residents.

Do not wait for nearby residents to learn about the proposal by reading about it in the newspaper. Talk to them directly, either by traveling door-to-door, circulating an open letter or giving a presentation at a community gathering.

Listen to What They Are Saying.

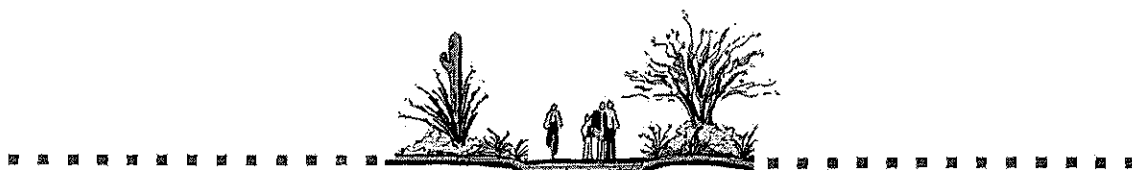
Take time to understand why adjacent landowners are opposed to the trail. Many of their concerns stem from fear of the unknown. Listen carefully, address specific concerns and try to arrive at solutions that benefit as many people as possible.

Find Allies among the Adjacent Residents.

Within the group of people who live adjacent to the proposed trail, you may find bicyclists, walkers, runners, horseback riders, families with active children or individuals with disabilities—all of whom will be likely trail supporters. Seek out these individuals, explain the trail's benefits and urge them to work for the conversion.

Give Adjacent Residents a Role in the Project.

Establish a trail advisory committee and ask adjacent residents to serve along with advocates and user groups. Often, when given a chance to participate in the process, a group of adjacent landowners may be willing to work toward solutions.



Invite Former Trail Opponents to Speak to Your Future Trail Neighbors.

If your group has some travel money, invite an articulate landowner who was once opposed to a trail to come speak in your community. Hearing the story of how an opponent became a trail advocate can help allay the concerns of future trail neighbors.

Bring in a Third Party to Help Build Consensus.

If you have difficulty forming a trail advisory committee, enlisting a third party may help identify the concerns of trail opponents and trail supporters. Bring in someone who is respected and trusted by both sides. You might contact the National Park Service's Rivers, Trails, and Conservation Assistance Program for help (202-485-9880).

Act in a Positive, Constructive Way.

Although it may be difficult at times, do not react in anger to claims made by trail opponents. No matter how unpleasant a discussion becomes, always treat everyone with fairness and sincerity. Be firm, factual and reasonable.

Work with as Many Landowners and Opponents as Possible.

While you are likely to encounter one or two people adamantly opposed to your trail, do not let them sidetrack you, unless they could truly stall your project. Identify milder opponents of the project and those individuals who are still undecided. Work hard to address the fears of this group and mobilize them in favor of the trail—they can add to your majority.

Reframe the Discussion from "River Corridor" to "Trail."

A completed trail is quite different from an unused river corridor. People who are unhappy with a littered, overgrown, unmanaged corridor should be made aware that a developed trail is managed and maintained, and has permitted uses and trail rules.

Work Hard for Favorable Reviews in the Media.

Favorable coverage in the media helps defuse the opposition and generate support for your cause. Give your project the best opportunity for positive exposure by supplying TV, radio and newspaper reporters and editors with interesting and accurate factual information.



Conclusion.

While trail opposition is one of the more difficult hurdles to cross during trail conversion, it need not stall your project. If you take the initiative from the outset to inform potential opponents about the trail project, listen to their concerns and keep them involved in the planning process, you will have a much easier time building strong support and creating a trail for your community.



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HOW TO EFFECTIVELY DEAL WITH PRIVATE LANDOWNERS

Information Source

Source: Charles A. Flink, ASLA, President of Greenways Incorporated. From the Maricopa Association of Governments (MAG) Bicycling and Walking into the 21st Century Conference Series, Creating an Off-Street Path System in an Urban Environment, conducted on April 25-26, 2000 at the Tempe Mission Palms.

Introduction

When dealing with private landowners, recognize that the traditional ties of people to their land are entirely legitimate. For many persons, in both rural and urban areas, their homes and property are their only assets. They understandably become concerned when they believe those assets may be lost or compromised. The following techniques can help in effectively communicating with private landowners.

Techniques

- Make sure that you have all of the facts in hand before approaching the landowner. Nothing is more detrimental to path/trail negotiations than an individual who has not conducted thorough research about a particular property or issue. Maintain your credibility.
- Always remain calm. Keep your cool. Never lose patience. Be pleasant, relaxed and positive, irrespective of the reaction of the landowner. Remember that property ownership is one of the most sacred rights in the United States.
- Acknowledge that their concerns are valid. Agree to conduct research into their concerns and provide them with appropriate resolutions to problems that they feel exist with the path/trail concept.
- Involve them in the decision-making process. Try to achieve a win-win solution by resolving issues that you feel are mutually acceptable to both parties. For example, you might agree with the landowner that the drainage ditch in their backyard is an unsightly mess and should be cleaned.
- Define areas of compromise that can be achieved. Be flexible and encourage the landowner to be flexible. For example, the landowner may be interested in



conservation of natural resources but unwilling to consider the right of public access.



A COMPILATION OF IMPORTANT INFORMATION AND DATA RELATED TO THE DEVELOPMENT OF TRAILS AND GREENWAYS

Information Source

This information was excerpted from Charles A. Flink, ASLA, President of Greenways Incorporated. From the Maricopa Association of Governments (MAG) Bicycling and Walking into the 21st Century Conference Series, Creating an Off-Street Path System in an Urban Environment, conducted on April 25-26, 2000 at the Tempe Mission Palms.

Introduction

The following text is excerpts that have been lifted from a Preliminary Master Plan Report and study that Greenways Incorporated was commissioned to prepare for the City of Toledo Metropolitan Parks District. The Report was prepared through a professional services contract for a design development and management plan that involves converting an abandoned 8.0-mile long rail corridor into a greenway trail. Some adjacent landowners objected to the development of the project, however, their objections have been fully and carefully addressed in the Master Plan Report, and the project is proceeding on schedule toward successful development.

Privacy, Safety and Security of Adjacent Properties

Landowners whose property abuts or lies adjacent to abandoned railroad lines will often define a position in opposition to the development of the Rail-Trail Greenways. Most of this opposition is based on the belief that a proposed trail will have a negative impact on the lifestyle, privacy and security of adjacent residential homes. Rail-Trail advocates have a high regard for the concerns of adjacent landowners, and want to provide the following useful facts related to trespassing, criminal activity, litter, noise, loss of privacy and lowered property values. Several local, regional and national studies have recently been completed that provide up-to-date, useful and factual information about these topics:

- The Impacts of Rail-Trails: A Study of Users and Nearby Property Owners form Three Trails. Produced in 1992 by the Pennsylvania State University and the U. S. Department of the Interior. (Referred to below as the "Penn State" study)
- The Economic Impacts of Protecting Rivers, Trails and Greenway Corridors: A Resource Book. Produced in 1991 by the U. S. Department of the Interior. (Referred to below as the "National Park Service" study)



- Converted Railroad Tracks: The Impact on Adjacent Property. Prepared in 1988 by Leonard P. Mazour, Kansas State University. (Referred to as the “Kansas State” study)
- Trails as Economic Development Tools. Produced in 1991 by Uel Blank, The HTR Group, University of Missouri. (Referred to below as the “Missouri” study)
- Greenway Use and Users: An examination of Raleigh and Charlotte Greenways. Prepared in 1990 by Owen J. Furuseth and Robert E. Altman, University of North Carolina at Charlotte. (Referred to below as the “North Carolina” study)

Who Uses a Rail-Trail?

First and foremost, a community should determine who would make use of a rail-trail and for what purposes. Fortunately, a number of greenway and rail-trail user studies have been completed during the last four years which provide definitive empirical data that describes a typical greenway/trail user.

In North Carolina, the UNCC study used an “intercept method” to survey several hundred greenway users in Raleigh and Charlotte. The greenways in these studies are in urban and suburban settings and are narrow linear corridors that abut private land, surrounded by suburban residential, commercial, office, institutional and industrial land uses. The purpose of the study was to conduct face-to-face interviews with trail users in order to better understand the type of users, patterns of use, likes and dislikes of the users, and problems or concerns associated with trail use. The study concludes that approximately 60% of surveyed trail users originated from local neighborhoods, and 90% traveled to the greenway from areas of the community within 10 miles of the facility. In essence, trail users are in fact local residents from local neighborhoods. Further, these users are educated, adult, middle aged and elderly, and are employed in high skilled, high wage jobs. In Raleigh, a majority of the users, 53% were women, while in Charlotte 52% were men. The majority of users enjoyed walking, jogging or biking along the trail. Most users were frequent visitors to the trails.

The Kansas State study describes two rail-trails in Minnesota, one a rural trail the other a suburban trail. The study defines the attitudes of adjacent property owners prior to the development of a rail-trail, and after the rail-trail has been in place for a couple of years. The study illustrates that adjacent landowners often times anticipate concerns such as crime, trespassing, and lowered property values, which in fact never materialize once the



rail-trail has been completed. Data was collected from adjacent landowners, law enforcement officials, trail managers, real estate agents and local politicians. With respect to typical rail-trail users, an estimated 88% of adjacent landowners, many of who were originally opposed to the rail-trail projects, now make use of the facility for bicycling, hiking, jogging and cross country skiing. Eight-five (85%) of the adjacent landowners experience no "major problems" with the rail-trail.

The Penn State study defines three rail-trails in different parts of the country, one in rural Iowa, a second in suburban Florida and a third in urban California. The study examines the impacts of rail-trails on both trail users and nearby property owners. A profile of trail users is one of the results of the study. Data was collected by surveying 1075 trail users, 663 property owners and 71 Realtors and appraisers. The study concludes that most users live near the trail, within 5 miles or less of the facility, and use the facility frequently. Use was divided equally among men and women. The majority of user activities on the trails were walking, jogging and bicycling.

The average age of the users was between 35 and 50. Most users were employed and the majority reported household incomes of %\ \$20,000 and higher, with one-fourth making more than \$80,000 per year. The majority of trail users held college degrees. Most users reported few problems with trail use, however, a lack of drinking water and restrooms, and roadway intersections were the most frequently cited concerns.

The Missouri study, which defines the economic potential of rail-trails, states that in 1982 the proposed 4.5-mile MKT Parkway rail-trail, in suburban Columbia, Missouri, was vigorously opposed by adjacent property owners who feared misuse and mismanagement of the abandoned rail corridor. Today, the trail is the most popular facility in the city's parks system, and is frequently used by many of the people who originally opposed the trail.

From these studies, it is evident that rail-trail greenways are most often used by residents from the residential, commercial, industrial and institutional lands that surround the abandoned railroad track..

Criminal Activity Associated with Rail-Trails

Virtually all of the studies cited above conclude that the fear of criminal activity is far greater than the actual crime that occurs on a rail-trail greenway.



In North Carolina, the UNCC study concludes that the majority of users indicated that greenway trails exhibited very few problems with crime: 59% of Raleigh users and 75% of Charlotte users declared that crime was "not a problem." Most users stated that the greenway trail system was clean (64% in Raleigh and 83% in Charlotte), and that the facilities had not been vandalized but were in good working order.

The Kansas State study reveals more detailed information about the perception of criminal activity and what actually occurs. Seventy-three (73%) of adjacent landowners view the rail-trail as desirable, and 85% had not experienced any major problems with the trail. The vast majority of adjacent landowners (80%) believe that rails do not increase the opportunity for violent crimes. Law enforcement officials and trail managers form these rail-trails support this conclusion based on criminal activity reports which contain very few incidents of reported crime. An estimated 30% of adjacent landowners did report being approached by a trail user asking for a drink of water, use of a phone or in need of directions. Most adjacent landowners admitted that their original fears of criminal activity were far greater than they have ever experienced.

The Penn State study concludes that rail neighbors experienced few problems as a result of trail development. The most frequent complaints included unleashed or roaming pets, illegal motor vehicle use and litter on the trail. Most resident (90 to 97%) responded that living near to or next to the rail-trail was better than living next to the abandoned rail corridor. Violent criminal activity, trespassing, and vandalism were reported to be very low for all three trails-which have been opened for use for at least two years, and as much as 17 years, prior to the study taking place.

Loss of Privacy

Loss of privacy can stem from direct visual connection from a public use greenway trail to adjacent private property; from physical access to properties because no delineation between public and private properties is present in the landscape; and from noise that is generated from trail users.

In all of the studies, loss of privacy was an issue that was appropriately addressed during the design, development and management of the rail-trail greenway. The North Carolina study was conducted on numerous greenways that abut private property-sometimes so close that trail users are able to see through vegetative buffers and into the backyards of adjacent property owners. However, the loss of privacy did not emerge as a major concern in the study of these greenways.



The Kansas State study noted that loss of privacy continues to be a concern for 25% of the residents who live along the rail-trail. However, 75% of the adjacent landowners did not feel that loss of privacy was an issue in the development of these rail-trails. The State of Minnesota and municipalities have a program for installing fences between the public use trail and private properties upon request. Earlier public surveys of these trails indicate general approval of this program and its ability to provide adequate separation.

The Penn State study also revealed that loss of privacy was also a continuing concern for an only 19% of the adjacent landowners. More than 80% of the landowners stated that loss of privacy decreased or did not change since the trail was opened.

Economic Impacts on Adjacent Property Values

Finally, a major concern to many landowners who lie adjacent to proposed rail-trails is the impact that greenways have on the value of adjacent private property. Some landowners will tend to view the development of a rail-trail greenway as a negative impact on their quality of life and the real estate value of their property.

The Penn State study, cited earlier within the report, makes a solid and substantial conclusion that rail-trail development does not have adverse effects on property values. Again, the study conducted interviews with 663 property owners and more than 71 Realtors and property appraisers. From the interviews, the study concludes that a majority of property owners believe that the presence of a rail-trail will make their property easier to sell; that the rail-trail either had no impact on the appeal of the property, or in fact added re-sale appeal; and that the rail-trail adds monetary value to their property.

The Kansas State study reveals that 87% of the property owners along the Luce Line rail-trail believe that the trail contributes to an increase in property value, or has no ill-effects on the value. Real estate appraisers in this study cited rail-trails as a positive selling point for suburban residential properties.

In the National Park Service study, a graphic illustrates that the closer a property is to a quality-oriented public park facility, the higher the real estate value. This study also cites the popular and widely used Burke-Gilman Trail in Seattle which indicates that properties near the rail-trail can appreciate by as much as 6 percent over similar properties that are further away from the trail.

There is very little local, regional or national evidence available to support the claim that rail-trail greenways drive down the market value of adjacent properties. Even during the



height of the economic recession, we have been all across the United States that properties near greenways, parks and rail-trails were still appreciating in value, and in some cases were the only properties being sold.



COSTS AND BENEFITS OF TRAILS

Information Source

This information is available from the U.S. Pedestrian and Bicycle Information Center, www.bicyclinginfo.org.

Introduction

Organizations such as the Rails to Trails Conservancy have documented the many benefits of trails in great detail. Some of these benefits are described below.

Promoting Tourism and Economic Development

A 1992 National Park Service study of three trails documents the economic benefits generated by trail users, as do local studies of trails such as the Little Miami River Trail in Ohio and the Northern Central Trail in Maryland.

Preserving the Nation's Industrial Heritage

The rich industrial heritage of Southwestern Pennsylvania can be traced through a series of trails including the Ghost Town Trail and Youghieny River Trail.

Providing Safer Places to Bicycle and Walk

Cleaning up Abandoned Industrial Sites

A growing trail network in Pittsburgh, including the Eliza Furnace Trail, is reclaiming the city's riverfronts from disused industrial plants.

Encouraging Alternative Transportation Routes

An study of three regional trails, published in the Transportation Research Board's TR News, estimated that at least one third of trips on the Pinellas, Burke Gilman and Minuteman trails were for work or shopping trips rather than purely recreational rides. Some trails, such as the Bill Chipman Palouse Trail linking two university campuses in Moscow, Idaho and Pullman, Wash., clearly serve as critical transportation links for bicyclists and pedestrians.



Creating Linear Parks and Public Space in Crowded Urban Areas

Seattle's Burke Gilman Trail provides a delightful tree-lined ride or walk through residential areas to the University of Washington Campus and on towards the downtown area.

Preserving Natural Corridors and Native Species

Trails such as the Iowa Heritage Trail and Nebraska's Cowboy Trail connect, preserve and provide access to natural areas and plant species that can rarely be found outside the undeveloped railroad corridor.

The cost of developing trails such as these varies according to land acquisition costs, the type of trail surface, the width of the trail, and the facilities that are provided for trail users. Construction costs alone can run \$40,000 per mile for a soft surface trail, and this can rise to more than \$125,000 per mile for an asphalt trail.



ECONOMIC BENEFITS OF GREENWAYS: SUMMARY OF FINDINGS

Information Source

The American Greenways Program Fact Sheets. American Greenways Program: www.conservaionfund.org. Adapted from: Economic Impacts of Protecting Rivers, Trails, and Greenway Corridors - National Park Service, 1990.

Real Property Values

Many studies demonstrate that parks, greenways and trails increase nearby property values, thus increasing local tax revenues. Such increased revenues often offset greenway acquisition costs.

- California's Secretary for the State Resources Agency estimated that \$100 million would be returned to local economies each year from an initial park bond investment of \$330 million (Gilliam, 1980).
- A greenbelt in Boulder, Colorado increased aggregate property values for one neighborhood by \$5.4 million, resulting in \$500,000 of additional annual property tax revenues. The tax alone could recover the initial cost of the \$1-5 million greenbelt in three years (Cornell, Lillydahl, and Singel, 1978).
- In the vicinity of Philadelphia's 1,300 acre Pennypack Park, property values correlate significantly with proximity to the park. In 1974, the park accounted for 33 percent of the value of land 40 feet away from the park, nine percent when located 1,000 feet away, and 4.2 percent at a distance of 2,500 feet (Hammer, Coughlin and Horn, 1974).

Expenditures by Residents

Spending by local residents on greenway related activities helps support recreation related business and employment, as well as businesses patronized by greenway and trail users.

- Residents are increasingly spending vacations closer to home, thus spending increasing amounts of vacation dollars within the boundaries of the state (NPS 1990).



- In 1988, recreation and leisure was the third largest industry in California. More than \$30 billion is spent each year by Californians on recreation and leisure in their state. This amounts to 12 percent of total personal consumption (California Department of Parks and Recreation, 1988).

Commercial Uses

Greenways often provide business opportunities, locations and resources for commercial activities such as recreation equipment rentals and sales, lessons, and other related businesses.

- Along the lower Colorado River in Arizona, 13 concessionaires under permit to the Bureau of Land Management generate more than \$7.5 million annually, with a major spinoff effect in the local economy (Bureau of Land Management, 1987).
- Golden Gate National Recreation Area has contracts with ten primary concessionaires. Total 1988 gross revenues for these concessionaires were over \$16 million, over 25 percent of which was spent on payroll (NPS, 1990).

Tourism

Greenways are often major tourist attractions which generate expenditures on lodging, food, and recreation related services. Moreover, tourism is Maryland's second largest and most stable industry, and is projected to become its largest.

- A poll conducted by the President's Commission on Americans Outdoors found that natural beauty was the single most important criterion for tourists in selecting outdoor recreation sites (Scenic America, 1987). Maryland's Department of Economic and Employment Development estimated the annual value of tourism and commercial activities directly related to the Chesapeake Bay was \$31.6 billion in 1989 (DEED 1989).
- The San Antonio Riverwalk is considered the anchor of the \$1.2 billion tourist industry in San Antonio, Texas. A user survey concluded that the Riverwalk is the second most important tourist attraction in the state of Texas (NPS 1990).
- The Governor's Committee on the Environment reported in 1988 that the governors of five New England states officially recognized open space as a key element in the quality of life in their region. They credited that quality of life with bringing rapid



economic growth and a multi-billion dollar tourism industry to the region (Governor's Committee on the Environment, 1988).

Agency Expenditures

The agency responsible for managing a river, trail or greenway can help support local businesses by purchasing supplies and services. Jobs created by the managing agency may also help increase local employment opportunities.

Corporate Relocation

Evidence shows that the quality of life of a community is an increasingly important factor in corporate relocation decisions. Greenways are often cited as important contributors to quality of life.

The quality of life in a community is an increasingly important factor in corporate relocation decisions; greenways are often cited as important contributors to quality of life and to the attractiveness of a community to which businesses are considering relocating.

- An annual survey of chief executive officers conducted by Cushman and Wakefield in 1989 found that quality of life for employees was the third most important factor in locating a business (NPS, 1990).
- St. Mary's County, Maryland, has found over the last ten years that businesses which move to the County because of tax incentives tended to leave as soon as the incentives expire. However, businesses that move to the County because of its quality of life remain to become long term residents and taxpayers (NPS, 1990).
- Site location teams for businesses considering San Antonio, Texas regularly visit the San Antonio Riverwalk. A location on the Riverwalk is considered very desirable. A regional grocer, the HEB Company, relocated its corporate headquarters to a historic building oriented towards the River (NPS, 1990).
- The Joint Economic Committee of the U.S. Congress reports that a city's quality of Life is more important than purely business-related factors when it comes to attracting new businesses, particularly in the high-tech and service industries (Scenic America, 1987).



Public Cost Reduction

The conservation of rivers, trails, and greenways can help local governments and other public agencies reduce costs resulting from flooding and other natural hazards. While greenways have many economic benefits, it is important to remember the intrinsic environmental and recreation value of preserving rivers, trails and other open space corridors. Greenways along rivers can help reduce the cost of repairing flood damage and improving water quality.

- In a study of major land uses in Culpepper County, Virginia, it was found that "for every dollar collected from farm/forest/open space, 19 cents is spent on services" (Vance and Larson, 1988).
- In Yarmouth, Maine, an analysis of costs of providing municipal services to a specific parcel proposed for parks showed that the annual costs of those services exceeded revenues generated by taxes by \$140,000 annually. This was compared to an annual cost of \$76,000 over 20 years to purchase the property (World Wildlife Fund, 1992).
- In Boulder, Colorado, the 1988 public cost for maintaining developed areas was estimated to be over \$2,500 per acre. The cost for maintaining open space in the city was only \$75 per acre, or less than three percent the cost of non-open space (Crain, 1988)



CRIME AND VANDALISM

Information Source

Source: The American Greenways Program Fact Sheets. American Greenways Program: www.conservationfund.org.

Issue

Do recreational trails and other types of greenways cause crime, vandalism and other disturbances? What evidence is there to support or to alleviate the concerns of adjacent land owners?

Facts

- There is little evidence to support the fear that greenway trails will produce disturbance to private landowners. In fact, the evidence is to the contrary.
- A 1980 study by the Minnesota Department of Natural Resources compared landowners attitudes on a pair of proposed trails with landowner attitudes along a pair of similar trails already established. On the proposed trails 75% of landowners thought that if a trail was constructed it would mean more vandalism and other crimes. By contrast, virtually no landowners along the two constructed trails (0% and 6%, respectively), agreed with the statement "trail-users steal". (Minnesota Dept. of Natural Resources, 1980)
- A 1987 study of Seattle's Burke-Gilman Trail found little or no crime or vandalism experienced by adjacent property owners. The study surveyed property owners, realtors, and police officers. According to the realtors, property "near" the trail is significantly easier to market and sells for an average of 6% more than similar properties located elsewhere. Nearly two-thirds of adjacent andowners believed that the trail "increased the quality of life in the neighborhood", and not a single resident thought the trail should be closed. (Evaluation of the Burk Gilman Trail's effect on Property Values and Crime, Seattle, WA Engineering Dept., 1987)
- A former opponent of the Burke-Gilman trail (whose home is on the trail) stated that the "trail is much more positive than I expected. I was involved in citizens groups opposed to the trail. I now feel that the trail is very positive; [there are] fewer problems than before the trail was built; [there was] more litter and beer cans



and vagrants [before it was built]." Not a single resident surveyed said that present conditions were worse than prior to construction of the trail.

- A 1992 study by the National Park Service of the impacts of trails on nearby property owners found that "a majority of landowners reported no increase in problems since the trails opened. That living near trails was better than they had expected it to be, and that living near the trails was better than living near unused railroad lines before the trails were opened". (Impact of Rail-Trails, National Park Service, 1992).

Comments from adjacent landowners interviewed for the NPS study included the following:

- ☐ "Vandalism, robbery and safety concerns I originally had were unfounded." - (Landowner on California's Lafayette/Moraga Trail) "I was very opposed to the idea at first, fearing that it would be used by motorcyclists, but I am very pleased with the trail - it provides a safe alternative to using the highway for joggers and bicyclists, and it gives me a safe and comfortable place for my walks." - (Adjacent landowner on Florida's St. Mark's Trail)
- ☐ "We are a small town and most everyone uses the trail at one time or another. The city of Durango has no bad comments to make on the trail; they all like it very much." - (Public Official on Iowa's Heritage Trail)
- A 1988 survey of greenways in several states has found that such parks typically have not experienced serious problems regarding ... vandalism, crime, trespass, [or] invasion of privacy ... Prior to developing park facilities, these concerns were strongly voiced in opposition to proposed trails. After park development, however, it was found that fears did not materialize ... concerns expressed by the neighbors opposed...have not proven to be a post-development problem in any of the parks surveyed. ("A Feasibility Study for Proposed Linear Park," Oregon Department of Transportation, Parks and Recreation Division, May 1988).
- A 1990 study by the Appalachian Trail Conference of crimes on the Appalachian Trail found that despite use by 3-4 million persons per year, there were only 0.05 per 100,000 or 1 in 2 million. This means you are more likely to be struck by lightning or victimized in your home than as a hiker on the Appalachian Trail. (Source: Appalachian Trail Conference, Harpers Ferry, West Virginia)



PROPERTY OWNER AND TENANT CONCERNS

Information Source

The American Greenways Program Fact Sheets. American Greenways Program:
www.conservationfund.org.

Introduction

People and institutions who own land along proposed greenway corridors are an important group. It is always a good idea to meet with property owners one-on-one. When approaching landowners, try to anticipate their concerns so that you can answer their questions and calm any fears. Ask about their concerns. Try to determine whether their concerns are real or the result of misinformation, hostility toward government, or simple territorial instincts. Always listen carefully and make sure landowners know you take these matters seriously. Landowner opposition can sink a greenway project or color public attitudes so that funding is difficult to secure. Remember, the greenway will affect them as much as anyone, so explain how the greenway will benefit them. Common landowner concerns are discussed below.

Liability

Always be prepared to discuss liability issues. What happens if someone is injured on the landowner's property? Is the landowner covered by adequate insurance, either his or her own or as provided by the land trust or state or local government liability legislation?

Crime

Even though there has been no documented increase in criminal activity on greenways, crime is almost always a concern. In *Greenways for America* (pp. 186, 187), Charles Little cites the example of Seattle's Burke-Gilman Trail. Police officers who patrolled the trail were interviewed about problems with crime and vandalism. Their response was that "there is not a greater incidence of burglaries and vandalism of homes along the trail." The police noted that problems in parks are generally confined to areas of easy motor vehicle access. Despite fears that greenways will be used by "outsiders," it's usually the local citizens who use the path. Merely opening a greenway to public use may in fact discourage unsavory activities in derelict areas. Safety issues will be different in a small, rural trailway than in a large recreational greenway in a big city. (See Fact Sheet No. 4)



Property Taxes and Property Values

Some people favor developing open space to expand the tax base. Expansion of the tax base, however, does not necessarily mean increased revenue to the local government. Development almost always means an increase in infrastructure and public service requirements, and the cost of providing these services often outweighs the additional tax revenue.

The other property tax issue you will probably face is a concern that the local government will increase taxes to pay for the greenway. In fact, increased tax revenues are usually generated by an increase in property values on land near the greenway. The exceptions would be jurisdictions where property assessments lag behind market values and states that have passed legislation limiting real-estate tax increases. Some communities have levied additional taxes to pay for greenways, but these taxes usually take the form of special assessments. Landowners who donate easements can actually reduce their own property tax assessments. In addition, easements reduce the cost of full acquisition for the town.

Private Property Rights

Some landowners are opposed to putting land into public ownership for any reason. You simply may not be able to change their minds, but we advocate that you stress the benefits to the community - their community.

Maintenance

Be prepared to answer a landowner's concern that the government can't maintain what it already manages, let alone new property.

Privacy

Landowners may be concerned about trespassing and privacy or about the trail interfering with agricultural or business activities on their property. To address this concern, some greenways use fences and landscaping to buffer private property; others, like the Stowe Recreation Path, literally give the landowners a blank map and let them site the path across their property. (See Fact Sheet No. 4)



Land Use

Be prepared to explain the concept of conservation easements. Organizations like the Land Trust Alliance and local land trusts can offer you assistance and provide you with information about easements and how other groups have used them.



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ARE TRAILS A BENEFIT TO ADJACENT OR NEARBY LANDOWNERS?

A SURVEY OF LANDOWNERS' PERCEIVED VIEWS OF PROPERTY VALUE AND ATTITUDES TOWARD MULTI-SE TRAILS AND TRAIL USERS

Information Source

Maricopa Association of Governments. West Valley Rivers Project. Literature Review of Opinions and Attitudes Toward Urban Trail Projects. Excerpt from Working Paper No. 1 from the West Valley Multi-Modal Transportation Corridor Plan. May, 2000.

Background

The 1994 Arizona State Trails Plan stated the need for good research to address Arizona Trail issues. This survey is the first step toward providing data for trail planners and advocates to use in developing and protecting trails.

900 questionnaires were mailed out to residents who lived adjacent to or near 6 trails in various urban areas throughout the State of Arizona (150 per trail).

The six trails surveyed were:

- Bent Tree Trail - City of Scottsdale
- Indian Bend - City of Scottsdale
- Woodland Lake Park Trails - Town of Pinetop-Lakeside
- Rillito River Park Trails - Pima County
- Murphy Bridle Path - City of Phoenix
- Rio de Flag - City of Flagstaff

401 surveys were returned, a 46% response rate.



Overall Results and Findings

- Out of 401 returns, there are 1,032 family members living adjacent/near the trail. Out of those, 83% of the residents along the trails show they benefit from trail use. Of these users, each family member uses the trail an average of 107 days a year for approximately 1 hour at a time.
- Data supports that trails do offer benefits to the landowners and their community. According to landowners, the primary reasons trails provide a benefit include: preserving/access to open space; health and fitness; aesthetic beauty; public recreation opportunities; and community pride.
- The top seven problems that adjacent/nearby landowners reported as a result of the trail users were: loss of privacy; dog manure on/near property; noise from the trail; illegal motorized vehicles; lack of trail maintenance; and unleashed and roaming pets. Although frequency rates were relatively low, vandalism and burglary due to trail users was more a perceived concern than an issue.
- 27% said living next to the trail was better than they had expected, 70% said it was as they expected, and 3% said it was worse.
- 317 thought it would be easier to sell their property because of the trail, 26 said it would be harder, and 158 didn't respond.
- 169 thought the trail would increase the resale value, 12 thought it lowered their property value, 203 thought it had no effect, 17 didn't respond.
- 57% said quality of life in their neighborhood had increased since the trail was built, 37% said it made no change, and 6% said it had worsened.
- 53% reported they were very satisfied, 42% reported they were satisfied, and only 5% were unsatisfied or very unsatisfied with the trails.

Conclusion

Although there are some concerns from adjacent landowners, the rates of occurrence of these, although serious, are relatively low. The results show that there are many benefits to living adjacent to or near a trail. Anyone involved with the development, construction, and maintenance of trail systems should find this information promising. There will



always be a need to recognize existing and potential problems and to work on solutions to positively and creatively work with adjacent landowners to address these issues.



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APPENDIX C: ALTERNATIVE SOLUTIONS TO PEDESTRIAN MID-BLOCK CROSSINGS AT CANALS

NOTE

Most of the on-site photographs in the original document have been omitted from this version of the final report. This report was prepared for the Maricopa Association of Governments in association with the City of Tempe. Produced by Logan Simpson Design, Inc. with A Dye Design and Lima & Associates Engineering. March 12, 1999.

PROBLEM DEFINITION

The network of canals in the MAG region is enjoyed by pedestrians and other users for recreation, exercise, and longer distance commuting. These canal routes cross more than 150 arterial streets in a mid-block location, away from a vehicular intersection. Currently, these types of crossings are not consistently marked or signed as crossings or protected by other means.

As alternative transportation modes grow in popularity, these types of mid-block crossings will be used more frequently. To ensure these crossings remain safe as the frequency of their use increases, the Maricopa Association of Governments Pedestrian Working Group initiated the mid-block crossing design assistance project.

The purpose of this paper is to record the discovery of prototypes and solutions that are being used by other jurisdictions and entities to increase the safety of pedestrians, bicyclists, and vehicles and other users, at similar mid-block crossing situations. These prototypical designs were then applied and tested as a means to enhance the pedestrian environment at two specific crossings. A cost estimate is include.

PROJECT AREA CROSSINGS

The project area includes two east/west arterial streets. Both streets connect to Interstate 10 interchanges, providing access to the communities of Tempe, Chandler, and Gilbert as



well as other points east. Project Crossing A is within approximately a 115 foot right-of-way for three travel lanes in each direction and a center turn lane with no bike lanes. The travel lanes are 11 feet inside, 11 feet middle, and 13 feet outside, with a turn lane of 14 feet. Project crossing B is not as wide, with two travel lanes each direction, and a center urn lane, including bike lanes. Travel lane widths for Project Crossing B are 11 feet inside and 12 feet outside with a turn lane of 11 feet.

These roadways serve single family neighborhoods as well as offices and light industrial areas. Future commercial areas are planned west of the canal crossing at Project Crossing B. A large Salt River Project facility is located on the northwest side of Project Crossing A.

The bicycle program of this city anticipates connecting the canal system north/south to another canal which runs east/west with a multi-use path network. Th canal system connects to other recreation and employment centers, including a park and golf course. The 1995 Bicycle Plan Facilities Update for this city includes development of all city canals for non-motorized usage.

CANAL MULTI-USE PATH

The canal intersecting the project crossings distributes water from the rivers flowing west through the metropolitan area to residential and agricultural areas in the southern parts of the Valley. This canal is part of an extensive water distribution system which carries water throughout the valley. The canal itself is 12 feet wide with side slopes of native soil. For the segment between Project Crossing A and B, the canal bank has been upgraded by adding a 10 foot wide concrete multi-use path. A structure over the canal connects neighborhoods on the east and west sides of the canal. Developed open space/recreation areas were recently completed on the west side of the canal in conjunction with residential home development.

The canal path is routinely used during the day and into the evening by residents of all ages. The following data was collected during four 15-minute periods on Thursday afternoon, Thursday evening peak, Friday morning peak, and Saturday morning on both roads.

- Off-peak hours: 4 bicyclists, 1 runner, and 1 walker in 1 hour, 15 minutes.
- PM Peak: 2 runners in 45 minutes;
- AM peak:3 runners in 45 minutes;



- Saturday: 8 runners and 2 walkers in 45 minutes.

Nineteen of the users appeared to be exercising adults. The other users consisted of a junior high school student riding his bike and a father jogging with his son riding his bike. Two of the 21 users crossed the arterial streets. One was a bicyclist who crossing Project Crossing A and the other was a runner who crossed Project Area B. The bicyclist waited for a gap in traffic to cross, while the runner waited for a westbound gap in traffic, jogged to the center of the street and then waited for a gap in eastbound traffic to cross.

ORGANIZATION OF REPORT

This report is organized as follows:

- The type of pedestrian area, according to the *MAG Pedestrian Area Policies and Design Guidelines* is identified. Determining the type of pedestrian area set the minimum standards each mid-block crossing must meet to be safe and pleasurable for pedestrians.
- Mid-block crossing elements are investigated and evaluated for effectiveness and conformity with the *Guidelines*.
- The approximate cost of each element is estimated.
- Preferred combinations of crossing elements are identified for a minimum standards situation and for an enhanced crossing.

PEDESTRIAN AREAS

Pedestrian areas are defined in the MAG region by the *MAG Pedestrian Area Policies and Design Guidelines* 1995 as "a location used by persons afoot, inclusive of the walkway, the roadway, and the adjacent surroundings our users." The level of pedestrian area was determined for each prototype to identify minimum criteria for a safe and functional pedestrian environment at each crossing.

Pedestrian areas are described as four physical types and at three qualitative levels. Levels refer to a range of qualitative pedestrian area characteristics, including pedestrian intensities and the relationship of the pedestrian to vehicles, with Level 1 being the least intense and Level 3 being the most intense. Pedestrian intensities vary at different canal



crossings, but are most likely to be Level 1 or Level 2. In this project, the trail itself is providing Level 1 service, but is escalated to a Level 2 at the crossing due to the high traffic volume on arterial streets. Project Crossing A had a traffic volume of 31,500 VPD (vehicles per day) in July 1995 and Project Crossing B had 28,500 VPD in November 1997. The speed limit on both roads is 45 MPH (miles per hour), also supporting a Level 2 description.

Types of areas are based on the mix of land uses and development densities adjacent to the pedestrian paths, expressed as Neighborhood, Community, Campus and District. Using the criteria described in the *Guidelines* document, the canal crossings occur in all four types of area, but the prototype crossings are in Neighborhood areas.

Based on these designations, the canal crossings at Project Crossings A and B should meet Level 2 - Neighborhood Criteria in policies and design guidelines. Because this is a design project, only the design guidelines criteria which will apply to the crossings are discussed below.

The criterion as state in the *Guidelines* document is shown in italics.

Level 2 - Neighborhood Criteria

***Guideline.** Provide six to eight foot (1.8 m to 2.4 m) minimum effective walkway width. Add two feet to the width of the walkway if it is adjacent to a roadway over 5,000 average daily traffic.*

The crossing should be ten foot wide, as should the walkways leading into it.

***Guideline.** Construct ADA accessible ramps in sidewalks, or provide intersection crossing free of obstacles.*

Ramps should be constructed in the sidewalk at the canal path entrance or exit. If above or below grade crossings are considered, they must be ADA accessible.

***Guideline.** Create curb extensions such as bulbing or medians for refuge to reduce crossing distance where streets are greater than two (2) lanes wide. Minimum median width should be five feet (1.5 m).*

On arterial streets such as Project Crossings A and B, median refuges are appropriate to reduce crossing distance. Due to the presence of bicycles, the refuge should be wide enough for a bike at rest, approximately 84". Bulbing would not be appropriate where it would block bicycle or vehicular travel lanes.



Guideline. Use stop signs rather than traffic lights (signing techniques).

Stop signs would not be appropriate at an arterial, because the continuous unnecessary disruption of traffic when users were not present would encourage disregard of the stop sign.

Traffic lights may be appropriate, but must be pedestrian activated to minimize signal changes and allow for free vehicular traffic flow.

Guideline. Combine several (traffic calming) treatments such as speed humps and channelization for a specific length of a street (slow streets).

Speed humps and channelization may suffice at mid-block crossings of an arterial, if user numbers warranted them and were consistently high during day and evening. There are not yet sufficient numbers to warrant this type of traffic calming at Project Crossing A or B.

Guideline. Maintain a five lane maximum where there is no on-street parking and an average of 15,000 vehicles per day.

Project Crossing A at the canal crossing has three (3) lanes in each direction, and a center two-way turn lane. Project Crossing B at the canal crossing is striped for two (2) lanes in each direction with a center two-way turn lane. The average vehicles per day on Project Crossing A is 31,500 (Taken on July of 1995) and on Project Crossing B, it is 28,500 (taken from November 1997). There is and will be no on-street parking.

Project Crossing A and B exceed this guideline. However, because regional paths can cross arterials of six and seven lanes, it is recommend that the crossing is considered and implemented with a high degree of support and refuge for the pedestrian and bicyclist.

Guideline. Provide a continuous walkable surface across walkways.

This refers to both the continuousness of the sidewalk across the multi-use path, and the continuousness of the surface across the streets. Both should be of a compatible surfacing material so they read as one facility.

(Enhanced design guideline). Upgrade the walkway surface to reflect the character of the area with decorative paving.



There is not a strong need for this type of treatment at the prototype crossings or most neighborhood crossings, but it could be appropriate at other crossings closer to a neighborhood node or where the sidewalk surface was enhanced.

Guideline. Establish trash receptacles and provide for their pickup at pedestrian gathering places such as transit stops and mailboxes.

Guideline. Provide seating opportunities at 500 foot (152 m) intervals along the primary pedestrian route. Seating opportunities could be either fixed or moveable, or sittable surfaces such as low walls.

(Enhanced design guideline). Add drinking fountains and restrooms at nodes.

(Enhanced design guideline). Develop plazas and small green spaces adjacent to pedestrian areas.

The crossings throughout the region may be near pedestrian gathering places, but should not be considered gathering places in their own right unless they are designated as a gateway or are developed in proximity to or conjunction with a larger activity center or facility. Therefore, they have no need for trash receptacles, seating, drinking fountains, restrooms, or plazas/green spaces.

Guideline. Establish 50% shade along pedestrian routes and at gathering place locations.

Establishing shade is critical to the functionality of the crossings in proportion to how long the pedestrian must wait to cross. If the crossing does not require a waiting time of longer than two minutes, shade is not crucial at the crossing itself. If the wait time is longer, shade is pivotal. Trees will also provide a sense of enclosure to the roadway and a gateway to the canal.

Guideline. Provide local jurisdictional standard street lighting level or a minimum of one footcandle.

One footcandle should be the minimum at all crossings, but we would recommend the upgraded requirement of two footcandles to enhance driver awareness and visibility for the users.

(Enhanced design guideline). Provide pedestrian-oriented signs. Pedestrian signs are at eye-level to a walking person, are fairly detailed in design, and provide information at walkway intersections.



Although this is considered an enhancement for Level 2 - Neighborhood pedestrian areas, implementation is recommended because the canal represents access from the neighborhood to a regional circulation system. Information should include destinations of note along the canal path or walkways, such as other recreation areas or activity areas.

Guideline. Separate bicyclists and pedestrians.

Separate crossings may not be feasible for bicycles and pedestrians, but adequate widths for both to cross at the same time at different speeds should be provided.

Stakeholder Neighborhood Design Criteria for Project Crossings

Neighborhood design criteria specifically for the project crossings were developed at a stakeholder meeting. The list of stakeholders for Project Crossing A and Project Crossing B is diverse and includes the municipality, Bike Advisory Committee, neighborhood associations, Allied Signal, Salt River Project, and office property owners.

The neighborhood design criteria identified by the stakeholders are to:

- Provide for long distance connections to the city's bicycle system;
- Minimize conflicts among users of the canal right-of-way, particularly SRP maintenance vehicles;
- Provide clear sight distance and visibility of canal users by drivers of vehicles on the roadway;
- Be cost effective for local communities to implement;
- Provide for the safe crossing of all users, including children, persons with disabilities, and seniors;
- Have regional applicability through meeting a minimum standards for implementation while suggesting enhancement techniques;
- Provide sufficient lighting to extend winter use with the shorter days and summer use as the air cools;



- Heighten drivers' awareness of the presence of a bicycle/pedestrian crossing, making it recognizable as something to expect valley wide;
- Accommodate equestrian as well as pedestrian and bicycle use as much as is feasible and practical; and
- Strive for parity between canal bank users and vehicles.

TYPES OF MID-BLOCK CROSSINGS DISCOVERED

Relatively few examples of "built" mid-block crossings over arterial streets were found in our research. However, several studies actually recommended mid-block over intersection crossings on arterials due to four factors: Pedestrians take responsibility for their own lives, using their own caution and judgment rather than relying on the drivers'; intersections can operate more efficiently for vehicles; there are fewer potential conflict points with vehicles; and sight visibility may be better.

Research Methods

A limited literature search of paths, trails, pedestrian and bicycle literature was conducted. Also, a limited search was conducted on the Web, using key words such as pedestrian, path, bicycle, trail and traffic calming. Municipalities suggested by the city of Tempe and others as discovered in the literature and web searches were contacted by telephone and interviewed on the topics of pedestrian and bicycle mid-block crossings, urban path systems, and user facilities. The resulting mid-block crossings fall into two main categories: Grade Separated Crossings and At Grade Crossing. Groups for each of the two main categories are noted below. Combinations for crossing elements are also described in the text and in Matrix 1.

Grade Separated Crossings

A grade separated crossing vertically separates the route that vehicles and pedestrians travel. There are two types of grade separated crossings – overhead bridges or underground tunnels.

In general, grade separated crossings are not recommended in a highly used pedestrian environment, because they reduce the liveliness of the main pedestrian route. Therefore, canal crossings near commercial districts, neighborhood centers or urban districts should generally be at grade. In the project application, the locations are predominately within



residential areas where liveliness at street level is not likely to be a criteria, and grade separated crossings should be considered.

Another criteria to determine if grade separation is an acceptable crossing type in a particular location is to determine the potential use of the crossing. Crossings may be underused because of the inconvenience of walking up or down a significant grade change, if the at-grade crossing is perceived to be readily available.

To evaluate the use of a pedestrian bridge, the formula for determining the acceptance of the grade separated crossing is as follows:

expected usage of grade separated crossing (in numbers of people) equals

$$\frac{\text{time on grade-separated device}}{\text{time on at-grade device}}$$

If the ratio is equal (1.0), the grade separated device will be used by 95% of the pedestrians. However, if the overpass takes 50% longer or more than the at grade crossing (1.5), almost no one will use the device. (This formula was obtained from a presentation given by the Traffic Institute of Northwestern University, instructor Mr. Alex Sorton.)

Overhead Bridge/Overpass. An overhead crossing will work well when one or both sides of the crossing will remain elevated, or where the barriers below are so severe as to generate strong desire for a separated crossing, or where there is such high-vehicle speed and/or traffic volume so as to reduce all potential crossing gaps.

Advantages. An overhead crossing can have positive impacts when:

- there will be no impediments in volume or speed for the vehicle,
- the users will be ultimately secure from vehicular collisions due to separation.

Disadvantages. However, an overhead crossing will also:

- require sufficient space for ramps and ramp access to meet ADA standards, sidewalks, utilities and other needs,
- possibly cause visual backyard intrusion,



- appeal to aesthetic issues,
- be a costly alternative device.

No overhead structure should be built where the pedestrian perceives that the at grade crossing is feasible and will save time, though more dangerous.

Underground Tunnel/Underpass. An underground tunnel will work well where the barriers to crossing at grade above are so severe as to generate strong desire for a separated crossing, or where there is such high vehicle speed and/or high traffic volume so as to eliminate all perceived potential crossing gaps.

Advantages. An underground tunnel will have positive impacts when:

- there will be no impediments in volume or speed for the vehicle,
- the users will be ultimately secure from vehicular collisions due to separation.

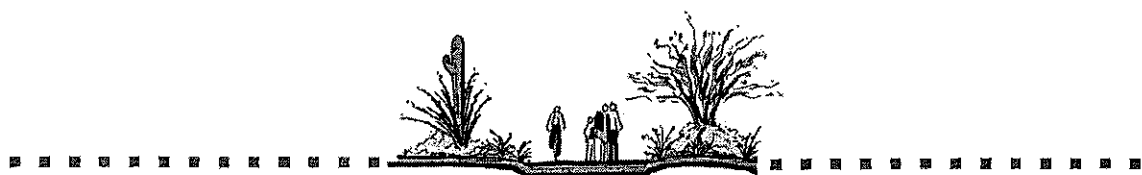
Disadvantages. However, an underground tunnel will also:

- require sufficient space for ramps and ramp access to meet ADA standards, sidewalks, utilities and other needs,
- elicit strong security objections,
- be one of the most costly of the alternative devices
- have a high maintenance/cleaning cost.

No underground structure should be built where the pedestrian perceives that the at grade crossing is still feasible, though more dangerous.

At Grade Crossings

Several types of at grade crossings were discovered, including curb extensions (also called bulbouts), pedestrian refuges (also known as medians), pedestrian-activated traffic signals and flashers, raised crosswalks, warning and regulatory signing and striping, and various combinations of those elements.



Curb Extension. Curb extensions extend the sidewalk into the roadway at a mid-block or intersection crossing, and are used to reduce the vehicular travelway width on opposite sides at a specific part of the road. No literature on curb extensions or bulbouts or any application of this tool was found on a non-urban arterial street such as the two in the project area that are examined in this report.

Advantages. Reducing the travelway width by curb extension will have many positive impacts:

- the driver will see a barrier at the edge of the roadway and slow down,
- the driver will recognize that the facility is for pedestrians and bicyclists and will use extra caution,
- users will achieve better visibility to the driver,
- and users will have less distance to travel across the roadway.

Disadvantages. Reducing lane width will:

- only work on an arterial street that has a generous lane width (more than 11' wide lanes)
- result in accommodations needing to be made where painted bicycle lanes exist. There must be a continuous ride for the cyclist along the roadway, so that the bicyclist does not have to compete with the vehicle for lane space.

Combinations. Curb extensions can be effectively used in conjunction with pedestrian refuges, signals, raised crosswalks, and signing and striping to create a more usable crossing.

Pedestrian Refuge. Pedestrian refuges are curbed median islands or delineated refuge islands in the center of the roadway designed to provide a layover place in the center of a wide street, so the pedestrian can make a two stop crossing.

The length of the median in either case should be at least 12' long. The width of the median must be adequate for resting a bike (84" minimum). Curbed medians are a common application on arterial streets, though they are usually installed to control vehicular access and not as a pedestrian refuge.



The delineated refuges may be marked with pain striping or some type of stanchions. Refuges delineated by stanchions or dagmars are less common, and are usually a response to retrofit requests or reflect a testing phase.

Advantages. The curbed median refuge can have several positive impacts:

- vehicle speeds may be reduced,
- the safety and visibility of the users will be enhanced,
- it may prevent passing at pedestrian and bicycle crossings, especially if used with a sidewalk extension,
- the refuge provides a place for slower users to rest and wait for the next gap in traffic,
- if the median is landscaped, or otherwise celebrated, it will draw attention to the canal path system itself, and create a sense of enclosure for the entry.

The delineated refuge islands offer a low-cost approach with a low impact on vehicle delay or safety. Delineations can be with dagmars or stanchions.

Disadvantages. Reducing lane width by adding a refuge:

- can only be contemplated where lanes are wider than 11',
- has a limited effect on speed of traffic,
- may impede access for canal maintenance vehicles,
- may add landscape maintenance costs,
- put bicyclists on the roadway at risk in a similar situation to the curb extensions by being squeezed where insufficient room has been left between a central median and the adjacent curb.

Combinations. Refuge medians can be used in conjunction with curb extensions, signals, raised crosswalks, and signing and striping to create a more useable crossing.



Signals. The use of traffic signals and some type of pedestrian activating device for mid-block crossings is generally dictated by the *Manual on Uniform Traffic Control Devices for Street and Highways*, (MUTCD) Section 4c-5. Under these criteria, pedestrian and bicycle counts are taken, and the traffic signal is either warranted or not warranted. Warrant 3 has recently been revised to provide more opportunities for traffic signals based on the needs of pedestrians. Several municipalities use this device in an urban setting. The City of Glendale uses a flashing light at 59th Avenue south of Thunderbird Road. The Town of Gilbert uses a flashing light at Gilbert Road and Bruce Avenue.

Advantages. Adding traffic signals at each canal intersection (regardless of warrant) will be several positive impacts:

- the safety of the users will be greatly enhanced,
- the motorist understands and responds well to this type of device,
- the user feels in control of the situation,
- sight distances can be improved,
- there are no turning movement conflict points,
- and the mid-block flashing signal provides a warning to the driver.

Disadvantages. A warrant study as defined by the MUTCD may need to be undertaken at each crossing. The disadvantages to this type of device are that:

- most crossings will probably not be able to meet warrant conditions (a ballpark figure would be volumes in the range of 200 to 300 pedestrians per hour),
- a high installation cost,
- additional maintenance is involved,
- the flashing signal does not provide a barrier for safe crossing.

It was noted that some municipalities included cyclists in the pedestrian counts to achieve the warrant, even though bicyclists are unlikely to walk their bikes across. Also, a second warrant can be obtained if the canal crossing is used as a school crossing, where the



number of gaps in the traffic stream during the period that children are using the crossing is less than the number of minutes in the same period.

Combinations. Signals can be used in conjunction with curb extensions, refuge medians, raised crosswalks, and striping.

Raised Crosswalks. A raised crosswalk is essentially a mid-block crossing striped as a crosswalk and raised to curb height above the level of the roadway. Portland, Oregon has used these successfully on arterial streets. Portland uses these in combination with regulatory signage.

Advantages. Adding raised crosswalks at each canal intersection will have several positive impacts:

- traffic speeds will be reduced,
- pedestrian and wheelchair users are provided with a much easier street crossing,
- the crosswalks are more visible to drivers.

Disadvantages. Raised crosswalks:

- may be somewhat expensive to build,
- may impact bicyclists (if constructed curb-to-curb),
- may impact drainage,
- are recommended (by the National Highway Institute) to be constructed only on roadways with two lanes and where the 85th percentile speeds are less than 45 miles per hour.

Combinations. Raised crosswalks can be used in conjunction with curb extensions, refuge medians, signing and striping to create a more useable crossing.

Signing and Striping. This category of devices includes signing, pavement marking, colored and textured pavement treatments, in pavement lights, and rumble strips. These devices provide visual and audible cues about the crossing area.



Traditional signing, with the “walking person” symbol is currently used by most MAG municipalities to provide advance warning to the mid-block crossing. In addition, some crossings are delineated by a painted at-grade crosswalk.

Advantages. Adding traditional signing and striping at each canal intersection will have these positive impacts:

- this is a relatively low cost solution,
- it is widely recognized by motorists,
- it enhances the visibility of the crosswalks for drivers.

Several studies recommended a different striping system than that usually used at intersections, such as diagonal bars or solid infill.

Disadvantages. Many municipalities, however, specifically discourage this type of response, citing that

- painted crosswalks give users a false sense of security,
- signing and marking do not physically prevent or deter vehicles from high speeds and inattention.

Combinations. Traditional signing and striping could be used in conjunction with curb extensions, refuge medians, traffic signals and raised crosswalks.

Textures. Surface textures, such as special paving in the crossing or before the crossing, are another common response to mid-block crossings. Rumble strips are included in this category.

Advantages. Adding surface textures before each canal intersection will have several positive impacts:

- if strongly contrasting enough, the surface texture will provide a cue of a changing environment and increase alertness to users and/or drivers,
- this treatment is also potentially aesthetically pleasing (Such as decorative pavement).



Disadvantages. Surface textures alone:

- do not physically prevent or deter vehicles from high speeds,
- do not provide enhanced accessibility to users in the crossing,
- may add unwelcome noise to a residential neighborhood,
- are not generally favored by bicyclists.

Combinations. Surface textures such as rumble strips or concrete pavers should be used in conjunction with curb extensions, traditional signing and striping, refuge medians, traffic signals and raised crosswalks.

Inpavement Lighting. Inpavement lights are a relatively new response to a pedestrian activated warning system. The two applications discovered in our research were in the cities of Santa Rosa, California and Maryland County, Delaware. They both provided generally the same type of lights, installed in the ground along the edges of the crosswalks, with a user activator post and button.

Advantages. Adding inpavement lights at each canal intersection will have several positive impacts:

- the crosswalks will be more visible to drivers,
- users will have some control over traffic gaps,
- and the device will be activated only when it is needed, leaving the vehicular access uninhibited otherwise.

Disadvantages. Disadvantages of the inpavement lights are:

- that they may be somewhat expensive to build,
- and it is a relatively new technology without many case studies associated with it.

Combinations. Inpavement lights can be used in conjunction with refuge medians, signing and striping, special paving, and raised crosswalks.



Railroad Arm Crossings. User activated railroad arm crossings were not discovered in use in our research, but would have a bar similar to that found controlling a railroad crossing, that would be activated by a push button or electronic eye.

Advantages. The railroad arm crossing would have several positive impacts:

- the drivers will stop for the arms,
- users will have good control over traffic gaps,
- this is a device readily recognizable to drivers,
- the device will be activated only when it is needed, leaving the vehicular access uninhibited otherwise.

Disadvantages. The railroad arm crossing would be:

- relatively expensive to install,
- this type of device is not currently used in this type of application.

Devices Considered Inappropriate for this Type of Crossing

Several traffic calming devices were considered and rejected for arterial canal crossings. These include speed bumps and humps (too many travel lanes and an unwarranted decrease in the expected speed limit), chicanes and woonerfs (residential application, no need for shared space), and rerouting to corner (not part of the scope of this project)(suggested distance: more than 150' from and intersection Virginia study or 600' MUTCD).

COSTS

To better understand and compare the cost efficiency of grade separated and at grade crossing alternatives, a series of matrices were constructed on the following pages (Matrices 1 through 5).

Matrix 1 illustrates that most at grade elements can be used together, but that grade separated crossings are self-sufficient.



Matrix 2 is a summary of advantages and disadvantages for each type of mid-block crossing.

Matrices 3 through 5 showed that at grade crossings are considerably more cost efficient than grade separated crossings. Pedestrian overpasses and underpasses cost substantially more than any of the at grade crossing alternatives. The railroad arm and raised crosswalk were the highest costing alternatives for at grade crossings.

NOTE: Certain costs will vary based on the width of the road and number of lanes. The cost estimates for alternatives within this category have been configured under Project Crossing B dimensions. Costs are calculated in 1998 dollars.

Matrix 1
Mid-block Crossing Element Combination Potentials
Design Options

Overhead Bridge/Pedestrian Overpass									
N/A	Underground Tunnel/Underpass								
N/A	N/A	Curb Extension							
N/A	N/A	●	Pedestrian Refuge						
N/A	N/A	●	●	Signals					
N/A	N/A	●	●	●	Raised Crosswalks				
N/A	N/A	●	●	●	●	Signing and Striping			
N/A	N/A	●	●	●	●	●	Textures		
N/A	N/A	○	●	○	●	●	●	Inpavement Lighting	
○	○	●	●	N/A	●	●	●	○	Railroad Arm Crossing

Legend:

●	Successful Mid-Block Crossing Combination
○	Unsuccessful Mid-Block Crossing Combination
N/A	Not applicable to any Mid-Block Crossing Combination



Matrix 2
Mid-block Crossing Elements
Design Options Summary

Type of Mid-block Crossing	Advantages	Disadvantages
Overhead Bridge/ Overpass	<ul style="list-style-type: none"> • No impediments in volume or speed of traffic • Pedestrian security from vehicular collisions 	<ul style="list-style-type: none"> • Requires sufficient space for ramps and utilities • Not very cost efficient
Underground Tunnel/ Underpass	<ul style="list-style-type: none"> • No impediments in volume or speed of traffic • Pedestrian security from vehicular collision 	<ul style="list-style-type: none"> • Requires sufficient space for ramps and utilities • Not very cost efficient • Strong security objections • High maintenance/cleaning cost
Curb Extension	<ul style="list-style-type: none"> • Barrier at edge of roadway will slow down drivers • Drive recognition of facility for pedestrians • Better pedestrian visibility of drivers • Less travel distance for pedestrian across roadway 	<ul style="list-style-type: none"> • Only works on streets with wider than 11' lanes • Additional accommodations for bicyclist space
Pedestrian Refuge	<ul style="list-style-type: none"> • Reduced vehicle speed • Enhanced pedestrian safety and visibility • May prevent passing at pedestrian crossings • Provides pedestrian space to wait for gaps in traffic • Added attention to canal trail system 	<ul style="list-style-type: none"> • Applied only where lanes are wider than 11' • Limited effect on speed of traffic • Limited access for canal maintenance vehicles • Possible maintenance costs, if landscaped • Lack of bicyclist space along roadway



Type of Mid-block Crossing	Advantages	Disadvantages
Signals	<ul style="list-style-type: none"> Enhanced pedestrian safety and visibility Motorists understand and respond to this device Increased pedestrian control Improved sight distances No turning movement conflict points 	<ul style="list-style-type: none"> Most crossings will not meet warrant conditions High installation cost factor Additional maintenance involved Flashing signal does not help pedestrian cross
Raised Crosswalks	<ul style="list-style-type: none"> Reduced vehicle speed Easier crossing for pedestrians and wheelchair users More visible to drivers 	<ul style="list-style-type: none"> Somewhat expensive to build Impacts on bicyclists Impacts on drainage NHI recommendations on implementation
Signing and Striping	<ul style="list-style-type: none"> Cost efficient Widely recognized by motorists 	<ul style="list-style-type: none"> False sense of security for pedestrian No physical prevention of vehicle high speeds
Textures	<ul style="list-style-type: none"> Increased alertness to pedestrians and drivers Aesthetically pleasing 	<ul style="list-style-type: none"> No physical prevention of vehicle high speeds Lack of accessibility to pedestrian in crossing Unwelcomed noise to neighborhood Not favored by bicyclists
Inpavement Lighting	<ul style="list-style-type: none"> More visible to drivers Some pedestrian control over traffic gaps Activated only when needed 	<ul style="list-style-type: none"> Somewhat expensive to build Relatively new technology
Railroad Arm Crossing	<ul style="list-style-type: none"> Drivers will stop for arms Good pedestrian control over traffic gaps Readily recognizable to drivers Activated only when needed 	<ul style="list-style-type: none"> Relatively expensive to install Not previously used in this type of application



Matrix 3
Estimate of Probable Costs
Canal Crossing Alternatives

Item Description	Qty.	Units	Unit Price	Total
OVERHEAD BRIDGE/ PEDESTRIAN OVERPASS	1	EA	\$750,000.00	\$750,000.00
	Subtotal			\$750,000.00
	8% Design & Engineering Cost			\$60,000.00
	15% Construction Contingency			\$112,500.00
	Estimate of Probable Cost			\$922,500.00
UNDERGROUND TUNNEL/ UNDERPASS	1	EA	\$750,000.00	\$750,000.00
	Subtotal			\$750,000.00
	8% Design & Engineering Cost			\$60,000.00
	15% Construction Contingency			\$112,500.00
	Estimate of Probable Cost			\$922,500.00
CURB EXTENSION				
Sidewalk Ramps	300	SF	\$4.00	\$1,200.00
	Subtotal			\$1,200.00
	8% Design & Engineering Cost			\$96.00
	15% Construction Contingency			\$180.00
	Estimate of Probable Cost			\$1,476.00
SIGNALS				
Pedestrian Push Button	2	EA	\$50.00	\$100.00
Post Foundation (Wiring & Install)	2	EA	\$15,000.00	\$30,000.00
Traffic Signal Face	2	EA	\$1,000.00	\$2,000.00
Pole/Mast Arm (45')	2	EA	\$15,000.00	\$30,000.00
	Subtotal			\$62,100.00
	8% Design & Engineering Cost			\$4,968.00
	15% Construction Contingency			\$9,315.00
	Estimate of Probable Cost			\$76,383.00



Matrix 4
Estimate of Probable Costs
Canal Crossing Alternatives

Item Description	Qty.	Units	Unit Price	Total
RAISED CROSSWALK	1	EA	\$12,000.00	\$12,000.00
	Subtotal			\$12,000.00
	8% Design & Engineering Cost			\$960.00
	15% Construction Contingency			\$1,800.00
	Estimate of Probable Cost			\$14,760.00
SIGNING				
Sign Post (U-Channel)	6	EA	\$83.00	\$498.00
Sign Post Foundation	6	EA	\$132.00	\$792.00
Sign (30" x 30")	72.5	SF	\$16.00	\$1,160.00
	Subtotal			\$2,450.00
	8% Design & Engineering Cost			\$196.00
	15% Construction Contingency			\$367.50
	Estimate of Probable Cost			\$3,013.50
STRIPING	1395	LF	\$0.30	\$418.50
	Subtotal			\$418.50
	8% Design & Engineering Cost			\$33.48
	15% Construction Contingency			\$62.78
	Estimate of Probable Cost			\$514.76
TEXTURES	300	SF	\$5.00	\$1,500.00
	Subtotal			\$1,500.00
	8% Design & Engineering Cost			\$120.00
	15% Construction Contingency			\$225.00
	Estimate of Probable Cost			\$1,845.00



Matrix 5
Estimate of Probable Costs
Canal Crossing Alternatives

Item Description	Qty.	Units	Unit Price	Total
INPAVEMENT LIGHTING				
Four lane Crosswalk System (12 Fixtures)	1	EA	\$6,500.00	\$6,500.00
Pedestrian Push Button	2	EA	\$375.00	\$750.00
Post Foundation	2	EA	\$240.00	\$480.00
	Subtotal			\$7,730.00
	8% Design & Engineering Cost			\$618.40
	15% Construction Contingency			\$1,159.50
	Estimate of Probable Cost			\$9,507.90
RAILROAD ARM CROSSING				
Includes Foundation, Arm. Lights, Bells and Supports	2	EA	\$6,200.00	\$12,400.00
	Subtotal			\$12,400.00
	8% Design & Engineering Cost			\$992.00
	15% Construction Contingency			\$1,860.00
	Estimate of Probable Cost			\$15,252.00



COMPARISON OF ELEMENTS TO CRITERIA

Another critical point in better understanding the type of crossing to recommend for Project Crossing A and B is to compare the MAG and neighborhood design guidelines to each of the crossing alternatives. Logan Simpson Design has compiled this information into two matrices on the proceeding pages (matrices 6 and 7).

When the applicable MAG guidelines were evaluated towards the mid-block crossing alternatives, curb extension and pedestrian refuge had the most conformity. The pedestrian bridge/overpass had the lowest conformity. This also strengthens the support of at grade mid-block crossings.

In contrast, the pedestrian overpass has the most conformity in the relationship between the mid-block crossing alternatives and neighborhood design criteria. Paving textures were discovered to have the least amount of conformity according to the neighborhood design criteria.



MAG Guidelines→							
Type of Mid-block Crossing	<i>Provide 6' to 8' minimum effective walking width. Add 2' to width of walkway if adjacent to roadway over 5,000 VPD.</i>	<i>Construct ADA accessible ramps in sidewalks, or provide intersection crossing free of obstacles.</i>	<i>Create curb extensions such as bulbing or medians for refuge to reduce crossing distance where streets are greater than 2 lanes. Min. median width 5'.</i>	<i>Maintain a five lane maximum where there is not on-street parking and an average of 15,000 VPD.</i>	<i>Provide a continuous walkable surface across driveways.</i>	<i>Provide local standards street light level or a minimum of one footcandle.</i>	<i>Separate bicyclists and pedestrians.</i>
Textures	●	◻	N/A	◻	◻	●	○
Inpavement Lighting	●	●	N/A	◻	◻	●	○
Railroad Arm Crossing	●	◻	N/A	◻	◻	●	○

Legend:

●	Mid-block Crossing Conforms with MAG Guidelines.
◻	Mid-block Crossing partially conforms with MAG Guidelines.
○	Mid-block Crossing does not conform with MAG Guidelines.
N/A	Mid-block Crossing is not applicable to any category.

Matrix 6
MAG Guideline Conformity
Design Options

MAG Guidelines→ Type of Mid-block Crossing	<i>Provide 6' to 8' minimum effective walking width. Add 2' to width of walkway if adjacent to roadway over 5,000 VPD.</i>	<i>Construct ADA accessible ramps in sidewalks, or provide intersection crossing free of obstacles.</i>	<i>Create curb extensions such as bulbing or medians for refuge to reduce crossing distance where streets are greater than 2 lanes. Min. median width 5'.</i>	<i>Maintain a five lane maximum where there is not on-street parking and an average of 15,000 VPD.</i>	<i>Provide a continuous walkable surface across driveways.</i>	<i>Provide local standards street light level or a minimum of one footcandle.</i>	<i>Separate bicyclists and pedestrians.</i>
Overhead Bridge/ Pedestrian Underpass	●	◻●	N/A	○	◻●	●	○
Underground Tunnel/ Underpass	●	◻●	N/A	●	◻●	●	○
Curb Extension	●	●	●	●	●	●	○
Pedestrian Refuge	●	●	●	●	●	●	○
Signals	●	◻●	N/A	◻●	◻●	●	○
Raised Crosswalks	●	●	N/A	◻●	●	●	○
Signing and Striping	●	◻●	N/A	◻●	◻●	●	○

Matrix 7
Stakeholder Guideline Conformity
Design Options

Neighborhood Design Criteria→ Type of Mid-block Crossing	Provides continuous connections to Tempe Bicycle System	Eliminates conflicts between users, particularly SRP vehicles	Provides clear sight distance and visibility of can users by vehicles	Cost effective for a range of communities	Provides safe crossing for all users	Regional applicability through minimum standards for implementation	Sufficient lighting could be provided	Heightens driver's awareness of canal crossing	Accommodates equestrians as well as pedestrians and bicycle	Provides parity in use for canal users as well as vehicles
Overhead Bridge/ Pedestrian Underpass	●	●	●	○	●	◻●	●	●	◻●	●
Underground Tunnel/ Underpass	●	● ¹	●	○	○	◻●	●	○	●	●
Curb Extension	◻●	○	●	●	○	●	◻●	●	●	●
Pedestrian Refuge	◻●	◻●	●	●	◻●	●	◻●	◻●	●	●
Signals	◻●	◻●	●	○	○ ²	◻●	◻●	●	●	●
Raised Crosswalks	◻●	○	●	◻●	◻●	◻●	◻●	◻●	●	◻●

¹ Route is shared with SRP vehicles.

² With flashing signal.

Neighborhood Design Criteria→	<i>Provides continuous connections to Tempe Bicycle System</i>	<i>Eliminates conflicts between users, particularly SRP vehicles</i>	<i>Provides clear sight distance and visibility of canal users by vehicles</i>	<i>Cost effective for a range of communities</i>	<i>Provides safe crossing for all users</i>	<i>Regional applicability through minimum standards for implementation</i>	<i>Sufficient lighting could be provided</i>	<i>Heightens driver's awareness of canal crossing</i>	<i>Accommodates equestrians as well as pedestrians and bicycle</i>	<i>Provides parity in use for canal users as well as vehicles</i>
Type of Mid-block Crossing										
Signing and Striping	○	○	○	●	○	●	◻●	◻●	●	◻●
Textures	○	○	○	●	○	◻●	◻●	◻●	●	◻●
Inpavement Lighting	● ¹	○	●	○	○	◻●	●	●	●	◻●
Railroad Arm Crossing	◻●	○	●	○	●	◻●	◻●	●	●	●

Legend:

●	Mid-block Crossing Conforms with neighborhood design criteria for canal crossing.
◻●	Mid-block Crossing partially conforms with neighborhood design criteria for canal crossing.
○	Mid-block Crossing does not conform with neighborhood design criteria for canal crossing.
N/A	Mid-block Crossing is not applicable to any category.

¹ With preactivated switch plate.

PREFERRED COMBINATIONS

Each of the individual types of devices discovered in our research has been described previously. Program elements that each device must meet were developed in the *Pedestrian Area Policies and Design Guidelines*. The comparisons of criteria and devices are found in the previous three matrices.

According to the criteria established for the Level 2 - Neighborhood and by the stakeholders, the basic mid-block crossings at Project Crossing A and Project Crossing B from the canal must:

- *Provide heightened awareness to the vehicle driver of the crossing pedestrians by traffic calming or signalization.*
- *Provide some boundaries for the pedestrian crossing by enhancing visibility of the crossing itself.*
- *Reduce the crossing distance to two lanes at a time.*

RECOMMENDATIONS FOR PROTOTYPES

Our recommendations for Project Crossing A and B crossings include combining several of the features to meet the criteria for these particular crossings. The combinations include:

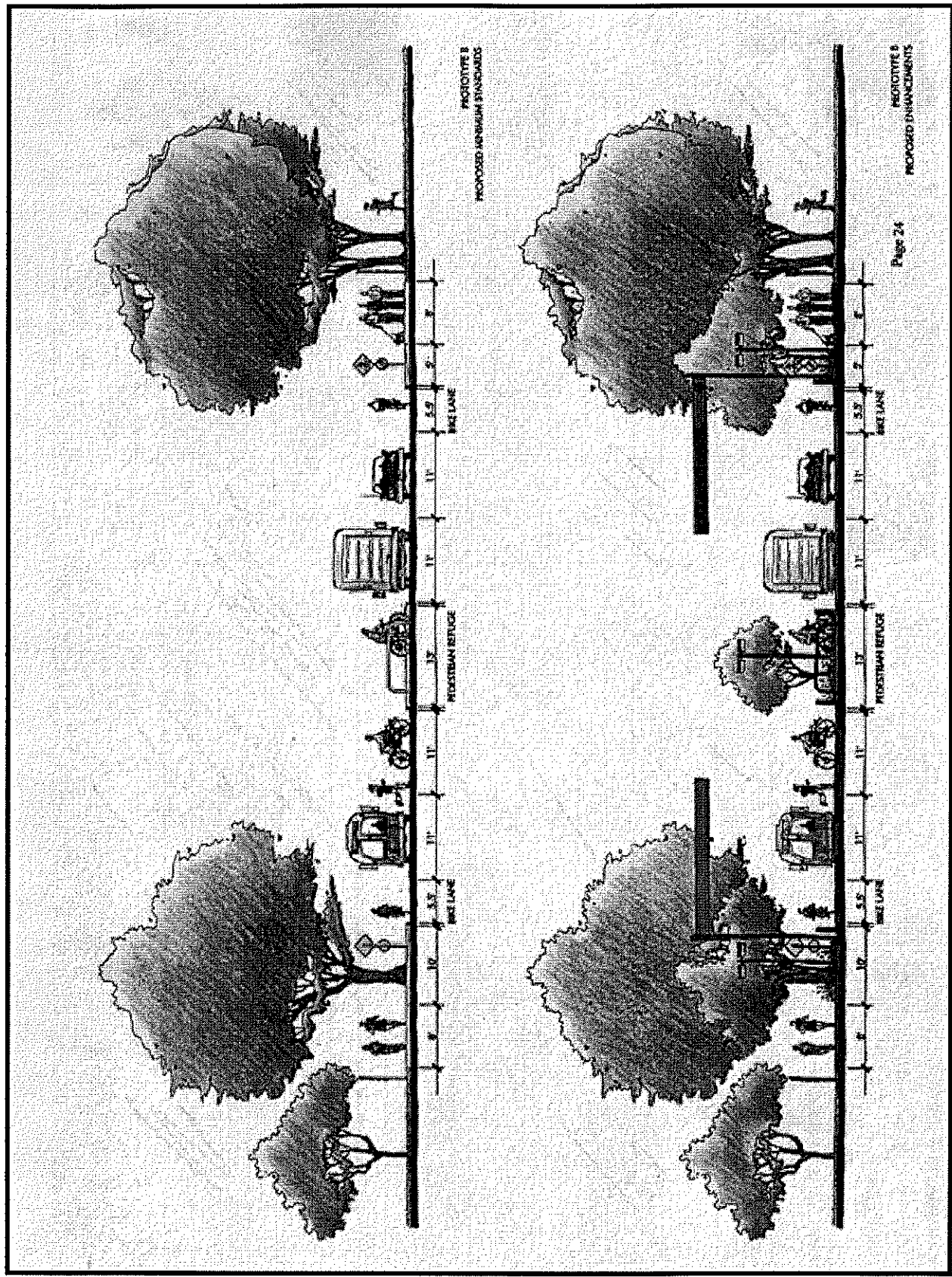
1. Curb extension to narrow lane width raised sidewalk, and a rumble strip approach.
2. Median island refuge and surface textures on approach, with traditional signing, and an option for in-pavement lighting.
3. Pedestrian activated traffic signal device and traditional striping.

The following sketches show the recommended elements applied to Prototype B. The upper sketch shows the minimum treatment necessary to establish a project crossing, and the costs are reflected in Matrix 9. The lower sketch reflects typical enhancements, with costs shown in Matrix 10.



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Matrix 9
Estimate of Probable Costs
Minimum At Grade Crossing Standard
Prototype B

Item Description	Qty.	Units	Unit Price	Total	Optional Items
Concrete Curb, 6" (Vertical) (No Gutter)	900	LF	\$12.00	\$10,800.00	
Least Expensive Option River Rock for Median (1 ½" - 3")	50	T	\$11.25	\$562.50	
Optional Decomposed Granite For Median	3400	SF	\$0.65		\$2,210.00
Optional River Rock for Median (3" to 8")	85	T	\$11.95		\$1,015.75
Optional Exposed Aggregate for Median	3400	SF	\$4.00		\$13,600.00
Optional Concrete Pavers for Median	3400	SF	\$5.00		\$17,000.00
Optional Saguaro (6' to 8' tall) for Median	10	EA	\$400.00		\$4,000.00
Optional Yucca (5 gallon) for Median	15	EA	\$20.00		\$300.00
Permanent White Striping (8" Wide)	1395	LF	\$0.30	\$418.50	
Stop Sign (30" x 30")	12.5	SF	\$16.00	\$200.00	
Speed Limit Sign	12.5	SF	\$16.00	\$200.00	
Speciality Sign (Canal Identity Marker)	4	M2	\$175.00	\$700.00	
Street Name Sign	12.5	SF	\$16.00	\$200.00	
Canal Name Sign	25	SF	\$16.00	\$400.00	
Leaning Rail	2	LF	\$60.00	\$120.00	
ADA Ramp	275	SF	\$4.00	\$1,100.00	
Sign Post Foundation	6	EA	\$132.00	\$792.00	
Sign Post (U-Channel)	6	EA	\$83.00	\$498.00	
Pedestrian Caution Sign (30" x 30")	12.5	SF	\$16.00	\$200.00	
Asphalt Removal	568	SY	\$2.00	\$1,136.00	
Asphalt Sawcut	5110	SF	\$1.00	\$5,110.00	
Asphalt Patching	203	ST	\$18.50	\$3,755.50	
Paint Bull Noses	2	EA	\$55.00	\$110.00	
Traffic Control	1	LS	\$7,000.00	\$7,000.00	
	Subtotal			\$33,302.50	
	8% Design & Engineering Cost			\$2,664.20	
	15% Construction Contingency			\$4,995.38	
	Estimate of Probable Cost			\$40,962.08	

Matrix 10
Estimate of Probable Costs
Enhancements to Minimum At Grade Crossing Standard
Prototype B

Item Description	Qty.	Units	Unit Price	Total
Landscape (5 gallon shrub)	26	EA	\$20.00	\$520.00
Landscape (24" Box Tree)	25	EA	\$250.00	\$6,250.00
Decomposed Granite For Median	3400	SF	\$0.65	\$2,210.00
Raised Crosswalk	1	EA	\$12,000.00	\$12,000.00
Permanent White Striping at Crosswalk (8" Wide)	140	LF	\$0.30	\$42.00
Light Poles (Pole, Fixture, Foundation)	6	EA	\$2,500.00	\$15,000.00
Conduit/Trenching/Backfill for lighting and Undergrounding Power	200	LF	\$5.50	\$1,100.00
Mast Arm (45'), Post, Foundation, Signal, Wiring & Installation	2	EA	\$31,050.00	\$62,100.00
Audio Strips (10 strips in each direction)	460	LF	\$0.12	\$55.20
Decorative Pavement for Crosswalk	300	SF	\$5.00	\$1,500.00
Removable Bollards	20	EA	\$300.00	\$6,000.00
Drip Irrigation System	1	LS	\$80,000.00	\$80,000.00
Traffic Control	1	LS	\$7,000.00	\$7,000.00
	Subtotal			\$193,777.20
	8% Design & Engineering Cost			\$15,502.18
	15% Construction Contingency			\$29,066.58
	Minimum Standards Estimate			\$40,962.08
	Estimate of Probable Cost			\$279,308.04



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APPENDIX D: INTERNET RESOURCES

American Association of State and Highway Transportation Officials (AASHTO)
www.aashto.org

American Hiking Society
www.americanhiking.org

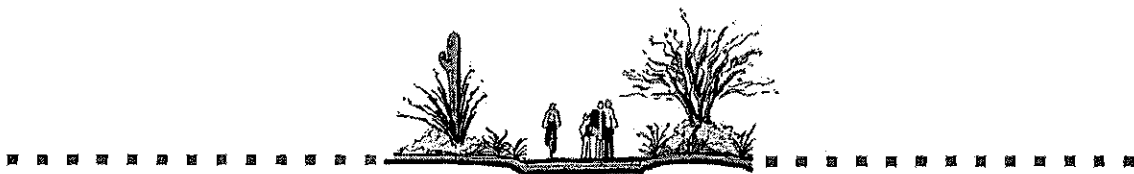
American Hiking Society is a recreation-based, conservation organization working to cultivate a nation of hikers dedicated to establishing, protecting, and maintaining foot trails in America. Our 13,000 individual members and 135 hiking club members contribute to this national effort.

American Rivers
www.amrivers.org

American Rivers is a national conservation organization dedicated to protecting and restoring America's river systems and to fostering a river stewardship ethic. The organization was founded in 1973 to expand the number of rivers protected by the National Wild and Scenic Rivers System. Along with our conservation efforts, American Rivers promotes public awareness about the importance of healthy rivers and the threats that face them.

American Trails
www.AmericanTrails.org

The mission of American Trails is to lead the nation toward the creation and implementation of a comprehensive trails infrastructure that meets the recreation, health and travel needs of all Americans. American Trails is the only national, nonprofit organization working on behalf of all trail interests. American Trails' members want to create and protect America's network of interconnected trails. We support local, regional, and long-distance trails and greenways, whether they be in backcountry, rural, or urban areas. Our goal is to support America's trails by finding common ground and promoting cooperation among all trail interests. We're involved in everything from training trails advocates to providing increased trail opportunities for individuals with disabilities.



**Arizona Department of Transportation
Transportation Enhancements Program**
www.dot.state.az.us/ROADS/rdside/index.htm

Contains information on the Arizona Transportation Enhancement Funds Program.

Association of Pedestrian and Bicycle Professionals
www.apbp.org

Founded in 1995, the Association of Pedestrian and Bicycle Professionals promotes excellence in the emerging professional discipline of pedestrian and bicycle transportation. Our members include leaders in the engineering, planning, landscape architecture, safety and promotion fields who specialize in improving conditions for bicycling and walking. They work for federal, state, regional and local government; consulting firms; non-profit organizations and the media. The association also welcomes academics, students and professional advocates who are committed to making bicycling and walking viable transportation options in the United States.

Bicycle Federation of America/National Center for Bicycling and Walking
www.bikefed.org/

This site is designed to support the activities and initiatives of people working across the country, in their professional work and private lives, to make America a better place to walk and to bicycle. We present informational resources, and outline actions government agencies, non-governmental organization and individuals can take to improve the environment for bicycling and walking.

The site focuses on issues of public health, including physical activity promotion, chronic disease prevention and environmental health, as well as transportation, land use, and public safety and injury prevention.

The Conservation Fund
www.conservationfund.org

The Conservation Fund seeks sustainable conservation solutions for the 21st century, emphasizing the integration of economic and environmental goals. Through real estate transactions, demonstration projects, education, and community-based activities, the Fund seeks innovative long-term measures to conserve land and water.



Since its inception, the Fund has forged partnerships to protect America's irreplaceable outdoor heritage on a scale that far exceeds its size--2.25 million acres saved-- a tangible legacy for future generations. The Conservation Fund sponsors the American Greenways Program, which strives to establish a nationwide network of public and private open space corridors. The program serves as an umbrella organization promoting the greenways concept at the national, state and local levels. It provides information and technical assistance on all aspects of greenway planning and development. It also provides small grants and assists in acquiring land for greenways.

Federal Highway Administration

www.fhwa.dot.gov

Bicycle, Pedestrian and Trails Program -

<http://www.fhwa.dot.gov/environment/bikeped/index.htm>

Funding Program: Congestion Mitigation and Air Quality (CMAQ), Recreational Trails, Scenic Byways, Transportation and Community and System Preservation Pilot Program (TCSP), and Transportation Enhancements:

<http://www.fhwa.dot.gov////////environment/fundprog.htm>

Transportation Equity Act for the 21st Century (including fact sheets on bicycle and pedestrian transportation): <http://www.fhwa.dot.gov////////tea21/index.htm>

Land Trust Alliance

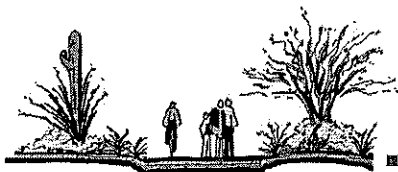
www.lta.org

The Land Trust Alliance (LTA), founded in 1982, is a national nonprofit association providing leadership and support for the nation's 1,200 grassroots land conservation groups known as land trusts, which have collectively helped to protect over 4.7 million acres of land. LTA's mission is to promote voluntary land conservation and strengthen the land trust movement by providing the leadership, information, skills and resources land trusts need to conserve land for the benefit of communities and natural systems.

Maricopa Association of Governments

www.mag.maricopa.gov

The Maricopa Association of Governments (MAG) is a Council of Governments (COG) that serves as the regional agency for the metropolitan Phoenix area. MAG is also the designated Metropolitan Planning Organization (MPO) for regional planning in the



Maricopa County region. MAG provides regional planning and policy decisions in areas of transportation, air quality, environment analysis, regional development, and social services.

National Highway Traffic Safety Administration

www.nhtsa.dot.gov

The National Highway Traffic Safety Administration (NHTSA), under the U.S. Department of Transportation, was established by the Highway Safety Act of 1970, as the successor to the National Highway Safety Bureau, to carry out safety programs under the National Traffic and Motor Vehicle Safety Act of 1966 and the Highway Safety Act of 1966. The Vehicle Safety Act has subsequently been recodified under Title 49 of the U. S. Code in Chapter 301, Motor Vehicle Safety. NHTSA also carries out consumer programs established by the Motor Vehicle Information and Cost Savings Act of 1972, which has been recodified in various Chapters under Title 49.

National Park Service - Rivers and Trails Conservation Assistance Program

www.ncrc.nps.gov/rtca/

Each year, the Rivers, Trails and Conservation Assistance (Rivers & Trails) program of the National Park Service help local groups with over 200 locally-led conservation projects -- like developing trails and greenways or protecting rivers and open space -- across the country. Typically, Rivers & Trails works with local groups for one to three years, just long enough to build momentum so that the local groups can finish the project on their own. They offer two kinds of assistance. These are described below. For more information on how to apply for assistance please see the website.

- **Staff Assistance.** Staff assistance requires a deep commitment between Rivers & Trails and a local group, a relationship that typically lasts one to three years, depending on the scope of the locally-led conservation project. Groups are assigned a Rivers & Trails staff person to help them work on their project.

Selection for Rivers & Trails staff assistance is competitive; in 1998, Rivers & Trails was only able to accept one-half of the applications they received from local groups. Groups that have successfully applied have: an involved public; committed local partners; an eye on results; and significant resources.

- **Consultations.** Some groups are not yet ready to apply for staff assistance from Rivers & Trails but would still like to receive some help. Consultations are



short-term engagements, typically comprising one or two meetings or phone calls, during which a Rivers & Trails staff person can assess a group's project, offer advice, and provide a one-time service, like facilitate a meeting.

No written application is needed for a consultation; just call the office listed below and ask for an appointment. In Arizona, contact:

Rivers, Trails and Conservation Assistance
National Park Service
Western Archeological and Conservation Center
1415 North 6th Avenue
Tucson, AZ 85705
Fax (520) 670-652

Cate Bradley e-mail cate_bradley@nps.gov
Phone (520) 670-6501
Joe Winfield e-mail joe_winfield@nps.gov
Phone (520) 670-6501

National Safety Council Partnership for a Walkable America
www.nsc.org/walkable.htm

The Partnership for a Walkable America is a new alliance of public and private organizations, and individuals who are committed to promoting the changes needed to make America more walkable.

The organization, while working closely with the DOT Secretarial Initiative for Pedestrian and Bicycle Safety and other federal projects, functions as an independent alliance. The Partnership represents safety, health and recreation interests of all populations including senior citizens and children. Anyone interested in making America a better place for walking is invited to participate.

National Transportation Enhancements Clearinghouse
www.enhancements.org

In 1991, the U.S. Department of Transportation turned its sights on developing a more modally balanced transportation system by encouraging projects that are "more than asphalt, concrete, and steel." The focus of building our transportation system now involves



consideration of environmental, cultural, economic, and social conditions in an effort to create a more balanced transportation system which provides people with choices and with a richer experience. An important program at the heart of this thinking about quality of life is transportation enhancements (TE). With funding intended to improve communities, the end goal of the TE program is to "leave a place better than we found it."

Since Congress introduced TE in 1991, more than \$2.4 billion has been invested around the country in facilities for walking and bicycling, historic preservation, scenic beautification, land acquisition, and environmental mitigation. In 1998, the TE program was reauthorized in the Transportation Equity Act for the 21st Century (TEA-21), ensuring that through 2003, about \$620 million in annual funds will be made available to State transportation agencies for these types of projects.

This web site can help you understand more fully how TE is implemented and how to make use of this provision of the nation's transportation program. In this site you will find an explanation of the TE program, documents about the program that you can obtain free of charge, a directory to connect you to people in your state who work on a daily basis with TE projects, and example projects, to name a few.

The National Transportation Enhancements Clearinghouse (NTEC) manages this web site. NTEC is an information service sponsored by the Federal Highway Administration and Rails-to-Trails Conservancy. It provides professionals, policy makers, and citizens with timely and accurate information necessary to make well-informed decisions about transportation enhancements.

Pedestrian and Bicycling Information Center

www.bicyclinginfo.org

www.pedestrianinfo.org

In June of 1999, the Pedestrian and Bicycle Information Center (PBIC) was established with funding from the US Department of Transportation to connect communities with the information and resources they need to create safe places for walking and bicycling. The Center is a program of the University of North Carolina Highway Safety Research Center in cooperation with the Association of Pedestrian and Bicycle Professionals.

The operation of the PBIC is also guided by input from the various agencies of the USDOT including the Federal Highway Administration, National Highway Traffic Safety Administration, Federal Transit Administration, and Federal Railroad Administration. The PBIC has also established a National Review Group, comprising more than 30



transportation, health, and advocacy leaders to provide input, advice, and feedback on the goals and objectives of the Center.

The core mission of the PBIC is to ensure that transportation engineers and planners, safety and health professionals, and advocates, have access to the best available information on improving conditions for bicycling and walking in the United States. Key activities to be undertaken initially to achieve this goal include: operating an information clearinghouse; generating new tools and resources; promoting information exchange; and supporting community involvement.

Pedestrian Safety Roadshow

www.ota.fhwa.dot.gov/walk/

Every year approximately 5,300 pedestrian are killed and about 80,000 injured in accidents with automobiles. Recognizing this, the Federal Highway Administration (FHWA) joined forces with the National Highway Traffic Safety Administration (NHTSA) and developed a new pedestrian program titled "Pedestrian Safety Roadshow (PSRS)." The purpose of the Roadshow is to assist communities in developing their own approach to identifying and solving the problems that affect pedestrian safety and walkability. It is a 4-hour workshop to community officials (e.g. engineering, planning, enforcement, educators, health), concerned citizens (e.g. youth groups, senior groups), and local business leaders (e.g. builders/developers, insurance). The objectives are to increase the awareness of pedestrian safety and walkability concerns, provide participants with information about the elements that make a community safe and walkable, channel their concern into a plan of action for addressing pedestrian concerns. It is designed for small to medium-sized cities, although it is adaptable for larger cities as well.

Rails-to-Trails Conservancy

www.railstotrails.org

The Rails-to-Trails Conservancy is a 13-year-old nonprofit organization dedicated to enriching America's communities and countryside by creating a nationwide network of public trails from former rail lines and connecting corridors.



Scenic America

www.scenic.org

Scenic America is the only national organization devoted to preserving America's scenic beauty. It provides information and technical assistance on ways to identify, designate and protect scenic road corridors in both urban and rural areas.

Sonoran Institute - Conservation Assistance Tools

www.sonoran.org

This electronic fundraising and technical assistance resource directory is a searchable database of grants, cost sharing, and technical assistance available for natural resources projects in the western United States. It is designed to help local communities reach the information, potential partners, and financial support needed to accomplish grassroots conservation projects in the West.

Surface Transportation Policy Project (STPP)

www.transact.org/

The goal of The Surface Transportation Policy Project is to ensure that transportation policy and investments help conserve energy, protect environmental and aesthetic quality, strengthen the economy, promote social equity, and make communities more livable. We emphasize the needs of people, rather than vehicles, in assuring access to jobs, services, and recreational opportunities.

Trust for Public Land

www.tpl.org

Founded in 1972, the Trust for Public Land is the only national nonprofit working exclusively to protect land for human enjoyment and well-being. TPL helps conserve land for recreation and spiritual nourishment and to improve the health and quality of life of American communities. TPL's legal and real estate specialists work with landowners, government agencies, and community groups to:

- create urban parks, gardens, greenways and riverways
- build livable communities by setting aside open space in the path of growth
- conserve land for watershed protection, scenic beauty, and close-to-home recreation



- safeguard the character of communities by preserving historic landmarks and landscapes.

TPL pioneers new ways to finance parks and open space, promotes the importance of public land, and helps communities establish land-protection goals.

TPL believes that connecting people to land deepens the public's appreciation of nature and the commitment to protect it. Since 1972, TPL has helped protect more than a million acres in 45 states – from expansive recreation areas, to historic homesteads, to vest-pocket city parks.

Walkable Communities

www.walkable.org/

Walkable Communities, Inc. is a non-profit corporation, established in the state of Florida in 1996. It was organized for the express purposes of helping whole communities, whether they are large cities or small towns, or parts of communities, i.e. neighborhoods, business districts, parks, school districts, subdivisions, specific roadway corridors, etc., become more walkable and pedestrian friendly.



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